

Corrective Action Plan

Building 637 North LUST Site Tooele Army Depot, Utah

DERR/UST Facility I.D. #8000047
DERR Release Site EIPL

April 3, 1998

Prepared by:

KLEINFELDER

Prepared for:

**U.S ARMY
CORPS OF ENGINEERING**

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TOOELE ARMY DEPOT, UTAH**

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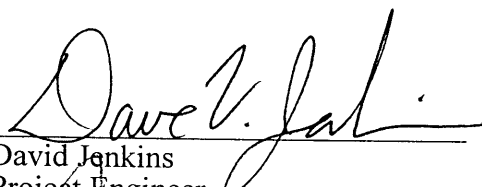
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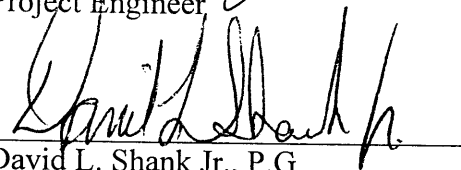
**CORRECTIVE ACTION PLAN
BUILDING 637 NORTH LUST SITE
TOOELE ARMY DEPOT, UTAH**

DERR/UST Facility I.D. #800047
DERR Release Site EIPL

Kleinfelder Job No.: 23-900023-A12

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1. EXECUTIVE SUMMARY

In 1994, underground storage tanks (USTs) were removed from three locations surrounding Building 637 in the Maintenance and Supply Area of the Tooele Army Depot (TEAD), in eastern Tooele County, Utah. One of the USTs, located at the northwest corner of Building 637, was used to store waste oil. Petroleum hydrocarbon compounds, primarily in the C20 to C30 range, were detected in soil samples collected when this UST was removed. Subsurface investigations were conducted at this site, designated "637 North" (637N), in 1995 and 1997. The objectives of the investigations were to assess the lateral and vertical extents of petroleum hydrocarbons in the soil, and to assess whether groundwater was affected.

On the basis of the subsurface investigation results, Kleinfelder concluded that the aerial extent of affected soil is approximately 4,225 square feet and the depth is 215 feet or less.

Kleinfelder recommended corrective action for the 637N site. The State of Utah Recommended Cleanup Levels (RCLs) are proposed as cleanup goals. Based on utilization of the RCL cleanup goals, the estimated area for remediation is 3,000 square feet.

Kleinfelder evaluated six individual remedial alternatives and combinations of these alternatives on the bases of cost, feasibility with respect to soil and contaminant characteristics, extent of contamination, and current and anticipated future land use. The six alternatives evaluated follow:

- No Further Action
- Natural Attenuation
- Excavation
- Soil Vapor Extraction (SVE)
- Bioventing
- Air Injection
- Capping

The preferred alternative is excavation of the soil to a depth of 12 feet and laterally to the Tier I RBCA screening level for contaminants of concern and bioventing to remove contaminants threatening groundwater in soils. Excavated soil would be disposed off site, and the excavation would be backfilled with clean, imported soil. This alternative was selected because it was the most feasible, implementable, and cost effective.

Cleanup is expected to require 2 years to achieve. When periodic monitoring results indicate completion of cleanup, a Remediation Verification Plan will be required by the State of Utah.

Impacts to groundwater from the LUST site are being evaluated as part of a larger-scale investigation of groundwater beneath the eastern portion of TEAD.

2. INTRODUCTION

2.1 SITE LOCATION

The Building 637 North (637N) site is located in the northern portion of the Tooele Army Depot (TEAD), in eastern Tooele County, approximately 35 miles southwest of Salt Lake City, Utah (Plates 1 and 2, Appendix A). The site is the former location of a waste oil underground storage tank (UST) [leaking underground storage tank (LUST) Utah Department of Environmental Quality, Division of Environmental Response and Remediation (DERR) Facility Identification #800047, DERR Release Site EIPL]. The UST was located at the northwest corner of Building 637 in a developed industrial section of TEAD known as the "Maintenance and Supply Area."

This Corrective Action Plan (CAP) addresses the LUST formerly located near the northwest corner of Building 637. Kleinfelder prepared the CAP on behalf of the Tooele Army Depot Directorate of Industrial Risk Management, Environmental Management Division. Kleinfelder's work scope was described in the U.S. Army Corps of Engineers (USACE) Work Scope dated September 18, 1996. The work was authorized by SDSTE-IRE-EP letter dated December 19, 1994, and performed under A-E Contract No. DACW05-95-D-022, Delivery Order #27.

2.2 CORRECTIVE ACTION PLAN OBJECTIVES

The objectives of this CAP are to evaluate remedial alternatives and, in accordance with State of Utah requirements, to select a timely, site-specific, and cost-effective remedial technology for cleaning up the 637N site to levels recommended by the DERR. Utah law requires the owner/operator of a LUST site to report, control, abate, and characterize a UST release by assessing the extent and degree of contamination and to conduct remediation if necessary. The DERR will review this CAP and provide guidance for the cleanup process.

The cleanup objective for the 637N soils is to reduce concentrations of petroleum hydrocarbons to State of Utah Tier 1 Risk-based Corrective Action (RBCA) levels or lower. Cleanup levels for chemicals of concern and associated site concentrations are discussed in Section 2.3.3.

2.3 SITE BACKGROUND

2.3.1 Site Use History

The Maintenance and Supply Area, which includes 637N, is comprised of paved streets, large warehouses and vehicle maintenance buildings, and underground and above-ground utilities. The ground surface includes both gravel- and asphalt-covered areas. Building 637 is an approximately 90,000 ft² wood frame building formerly used for vehicle engine and transmission repair, rebuilding, and testing. Two groups of engine test cells are present along the east and south walls of the building. USTs that supplied gasoline and diesel fuel to the engine test cells, and a waste oil UST were present at locations around the outside of Building 637. In 1994, England Construction (England) removed these USTs.

2.3.2 Site Investigation History and Findings

When the waste oil UST was removed, England collected two soil samples from the bottom of the excavation, as required by the State of Utah (Kleinfelder, Inc. and Jacobs Engineering Group, 1996). The samples were analyzed for petroleum hydrocarbon, halogenated volatile organic (solvents), and aromatic compounds. Subsequently, Kleinfelder collected two additional samples, which were analyzed for semi-volatile organic compounds. Neither solvents nor aromatic compounds were detected in the samples collected by England. Results of the remaining analyses for England's samples are presented on Table 1. Additionally, the laboratory reported approximate concentrations for tentatively identified alkanes and alkenes, and quantified the hydrocarbons in three ranges: C10 to C20, C20 to C30, and C30 to C36.¹ Hydrocarbons detected in the two samples that Kleinfelder collected were primarily long-chain compounds, with the greatest detected concentration in the C20 to C30 range (ibid.).

In October and November 1995, Kleinfelder investigated soils at the 637N site. The investigation included drilling and sampling 11 soil borings to depths of 20 to 46.5 feet (Plate 3), chemically analyzing 25 soil samples, screening for volatile organic vapors, and assessing soil permeability (Kleinfelder, Inc. and Jacobs Engineering, 1996). Total recoverable petroleum hydrocarbons¹ (TRPH), benzene, and polynuclear aromatic hydrocarbons (PAHs; naphthalene

¹ Considering the historical use of waste oil and diesel at the site, it was assumed that the TRPH is primarily waste oil and diesel range hydrocarbons. This assumption was verified by subsequent bench scale test results, which indicated diesel and waste oil concentrations (by EPA 8015M) that were equivalent to the TRPH results shown.

and benzo(a)pyrene) were detected in the soil samples at concentrations exceeding applicable State of Utah Level II recommended cleanup levels (RCLs) (Table 2A, 2B, and 2C). Low concentrations of several chlorinated solvents were also detected in the soil; chlorobenzene, methylene chloride, tetrachloroethene, and tetrachloroethane were detected above Level II RCLs, as shown in Table 2B.

The results of the 1995 investigation indicated the lateral extent of impacted soil as shown on Plates 3 and 4 (Appendix A). The lateral extent of impacted soil is estimated to be 65 feet by 65 feet (4,225 square feet). TRPH were detected in soil samples collected from the greatest depths explored in 6 of the soil borings—SB-01, -02, -03, -05, -06, and -09 (Plate 3).

Perched groundwater was encountered in several of the soil borings. The extent of the perched water was limited, and Kleinfelder concluded that a likely source was leakage from a shallow water line or storm drain (Kleinfelder, Inc. and Jacobs Engineering Group, 1996).

To further assess the vertical extent of petroleum-impacted soil, Kleinfelder conducted a supplemental subsurface investigation in April and May, 1997. The supplemental site investigation (SI) report is included in Appendix B. The supplemental SI work scope and procedures are described in the "Project Workplans, Additional Subsurface Characterization, Building 637-N, 637-SW, 637-SE and 691 LUST Sites" (Kleinfelder, Inc. and USACE, 1996). A summary of the investigation procedures and results is provided in the following paragraphs.

Kleinfelder drilled two soil borings; one boring (VW-1) was drilled to a depth of 300 feet through the former waste oil UST excavation (Figure 4). Two soil gas ventilation wells were installed in the boring, one to a depth of 60 feet and one to a depth of 240 feet. The other boring (C-16) was drilled to a depth of 365 feet and completed to a depth of approximately 360 feet as a groundwater monitoring well. The C-16 boring was drilled in a location where soils were not suspected to be contaminated (Plate 4). Groundwater was encountered at a depth of approximately 342.5 feet.

Soil boring logs and well construction schematics are in "Appendix B" of the supplemental SI report (Appendix B). Drilling, soil sampling, and C-16 well installation procedures are described in greater detail in "Monitoring Well C-16 Completion Report" (Kleinfelder, 1997).

Kleinfelder submitted 5 soil samples from the ventilation well boring and 3 soil samples from the monitoring well boring for chemical analyses. The samples were selected for analyses on the

basis of photoionization detector (PID) screening results. Each of the VW-1 boring samples was analyzed for volatile organic chemicals (VOCs), semi-volatile organic chemicals (SVOCs), and purgeable and extractable petroleum hydrocarbons. One of the VW-1 boring soil samples was also analyzed for iron, total Kjeldahl nitrogen (TKN), pH, phosphorus, and nitrate as nitrogen. The C-16 boring samples were analyzed for VOCs, SVOCs, purgeable and extractable petroleum hydrocarbons, and percent moisture. The two deeper samples from C-16 were collected from the saturated zone, and they were chemically analyzed for disposal profiling.

Purgeable and extractable petroleum hydrocarbons, VOCs, and SVOCs were detected in soil samples collected from depths of 38 and 45 feet in the VW-1 boring (Table 3). Purgeable and extractable petroleum hydrocarbons and VOCs were detected in the soil sample from a depth of 115 feet. Acetone was detected in two of the VW-1 soil samples at concentrations near the laboratory reporting limits of 10 and 11 micrograms per kilogram. This compound is a common laboratory contaminant and, in Kleinfelder's opinion, does not represent a soil contaminant. Extractable petroleum hydrocarbons, one SVOC and one VOC (acetone), were detected in the soil sample from 215 feet. The TPH concentration detected in this sample is low (88 milligrams per kilogram as diesel) (Table 3). With the exception of acetone, analyzed compounds were not detected in the soil sample from 300 feet. PID screening results did not exceed 100 ppmv below a depth of 71 feet (results less than 100 ppmv are not considered significant).

With the exception of acetone, analyzed compounds were not detected in the soil samples collected from C-16 (Table 3).

On the basis of the initial and supplemental SI results, Kleinfelder estimates the depth of contamination at 215 feet or less.

Four samples were collected from the new monitoring well, C-16. One sample each was analyzed for VOCs, SVOCs, purgeable TPH, and major ions. Groundwater sample analytical results are summarized on Table 4. One VOC, 1,2-dichloroethane (1,2-DCA), was detected at a concentration of 15 micrograms per liter ($\mu\text{g/L}$), which exceeds the U.S. Environmental Protection Agency drinking water standard maximum contaminant level of 5 $\mu\text{g/L}$.

Other groundwater contaminant plumes have been detected at TEAD. Therefore, Kleinfelder recommends any further investigations address groundwater on a site-wide basis.

2.3.3 Cleanup Levels

Petroleum hydrocarbon compounds were detected in 637N soils at concentrations exceeding DERR's Level II RCLs. RCLs are based upon site sensitivity, ranked according to physical characteristics such as depth to groundwater and annual precipitation. Level II RCLs are proposed as site cleanup levels (Table 5).

3. CORRECTIVE ACTION EVALUATION

3.1 OBJECTIVE OF CORRECTIVE ACTION PLAN

The objectives of the corrective action evaluation are to characterize the area of concern at the site, and then, if necessary, to evaluate and recommend a remedial option that is technically and economically appropriate for the site. A proposed design will be presented for the selected option, including an estimate of the operation time required for treatment and an approximate total cost of implementation.

3.2 EXTENT OF CONTAMINATION REQUIRING TREATMENT

The extent of contamination requiring treatment assumed for the CAP is the area where contaminants were detected at concentrations exceeding the respective RCLs. Four contaminant distributions will be addressed in the CAP for this site: high concentrations of non-volatile hydrocarbons in the diesel and waste oil range, relatively low concentrations of volatile hydrocarbons in the gasoline range, relatively low concentrations of semi-volatile PAHs, and low concentrations of chlorinated hydrocarbons. The magnitude and extent of contamination assumed for the CAP was based on available information in the initial and supplementary SIs. The total target area is assumed to be 3,000 ft² (see Plate 4), concentrated between depths of 10 and 220 feet below grade.

3.3 TREATABILITY OF CONTAMINANTS

Gasoline-range and chlorinated contaminants, and to a lesser extent PAHs, detected at the site are volatile and may be treated effectively by extraction technologies. The non-volatile fraction of the PAHs and the diesel and waste oil cannot be removed in situ via vapor phase extraction, so treatment options would be primarily limited to in situ biodegradation or soil excavation. Hydrocarbons at the site are degradable to varying degrees, except the chlorinated solvents. However, although treatment of the non-volatile contaminants at the site by biodegradation technologies would be effective, it could require considerable operation time.

3.3.1 Respiration and Bench Testing

To evaluate the degree to which non-volatile contamination at the site is biodegradable, an evaluation for subsurface respiration (oxygen uptake rate) in the shallow (40- to 60-foot depth range) and deep (120- to 260-foot depth range) soils was performed in the nested deep well at the site. In addition, soil from the 8- to 15-foot depth range contaminated predominantly with waste oil was also evaluated for degradability with bench-scale testing.

The results of the respiration testing indicated that subsurface respiration rates were 0.01 to 1.1 percent oxygen (O_2) per hour, which is sufficient to implement bioventing (AFCEE; 1996). Results of the bench test indicated that the diesel-range hydrocarbons were degradable at a rate of approximately 400 milligrams per kilogram (mg/kg) per month, and the motor oil range hydrocarbons were not measurably degradable with the 6-month test duration. The detailed results of the respiration and bench testing are provided in Appendix D.

In summary, it will be assumed that the motor oil contamination cannot be reasonably treated with bioventing, but the lighter diesel and gasoline-range hydrocarbons may be adequately treated using this technology.

3.4 PROPOSED REMEDIATION OBJECTIVES

The remediation objective is to develop a corrective technology that will ensure the remediated site is protective of human health and the environment. As such, the specific remediation objectives will be to mediate direct human exposure pathways (assumed to be the upper 12 feet of impacted soil) and to eliminate future threats of contamination to groundwater quality (mobile contaminants in the deeper soils).

The DERR offers specific contaminant concentrations that are considered acceptable at a site under specific conditions. These maximum allowable concentrations are typically used to formulate remediation objectives. These guidelines include a Tier I RBCA screening level based on a generalized contaminant-specific risk evaluation, and a more stringent Level II RCL that is applicable to sensitive sites. Considering the complexity of the site and the nature and depth of some contaminants present, achieving comprehensive Level II RCLs to the maximum detected depths is not technically feasible. Where technical or physical conditions exist that limit remediation, the Tier I RBCA screening concentrations will be the remediation objective. Consideration of Tier I RBCA screening concentrations is based upon the assumption that results

of a site-specific evaluation will indicate that the fundamental remediation objective of overall protectiveness can be satisfied.

3.5 DESCRIPTION OF REMEDIATION ALTERNATIVES

Soil remediation alternatives that will be screened for the site are described below. These alternatives were included based on current site conditions, data available from testing, and their recognized applicability on similar sites. It is assumed that alternatives will not involve exhaust gases, so treatment options for exhaust will not be considered.

1. **No Further Action at the Site** – This option involves forgoing active remediation of the site with the assumption that present concentrations are not a threat to human health or the environment. This option is typically considered when concentrations do not exceed regulatory criteria.
2. **Natural Attenuation** – This option involves forgoing active remediation of the site with the assumption that present concentrations, though modestly above regulatory criteria, are expected to naturally attenuate to an acceptable level in a reasonable time period. This option typically involves modest to long-term monitoring to confirm contaminant reduction with time.
3. **Excavation** – This option involves physically removing soil containing contaminants above the RCL. The excavated soil may be disposed or treated and replaced. Treatment may include on-site follow-up treatment such as soil washing, bioremediation, or thermal desorption.
4. **Soil Vapor Extraction (SVE)** – This option involves physically removing the TPH contamination from the subsurface, in-situ, by extracting contaminant-laden soil gas via perforated wells, and treating the discharge at the surface. This method is utilized when the contaminant of concern is volatile (vapor pressure above approximately 10 millimeters mercury).
5. **Bioventing** – This option involves drawing air through the soil in-situ by extracting soil gas from the subsurface via perforated wells. For this technology, extraction is performed to draw oxygen-rich air from the surface through the soil. This option typically takes longer to reach cleanup goals than a vapor removal technology; however, it is also effective for cleaning up non-volatile, degradable contaminants.

6. **Air Injection** – This option involves bioremediation by air injection. Atmospheric air is injected into the subsurface to facilitate aerobic degradation of the TPH contamination. Like bioventing, this option typically takes longer to reach cleanup goals than a vapor removal technology, but is effective in cleaning up non-volatile, degradable contaminants.
7. **Capping the Surface** – This option involves placing a cap at or just below the surface to reduce the potential for rainfall to penetrate the subsurface and carry contaminants downward to groundwater. Typically, this option is implemented when other available corrective options are technically infeasible to implement.

3.6 INITIAL SCREENING OF REMEDIAL ALTERNATIVES

The seven alternatives were screened using three general criteria: 1) effectiveness, 2) implementability, and 3) cost. Effectiveness includes the alternative's ability to attain cleanup goals and to protect human health and the environment during remediation activities. Implementability includes technical feasibility and acceptability to regulatory agencies and the public. For the screening evaluation, each alternative was judged to be implementable and effective or was eliminated from further consideration for a stated reason. For screening, alternatives were not compared to each other for implementability or effectiveness.

Detailed costs were not prepared for the screening evaluation. Therefore, cost was considered during the screening process when the generalized cost estimate for a remediation alternative was significantly higher (approximately 50 percent or more) than the estimates for other alternatives.

The initial screening results for the seven remediation alternatives listed above indicate that some are not feasible because of prohibitive costs or difficulties in implementation. The alternatives that were eliminated during initial screening are discussed below. Section 3.8 provides a detailed assessment of the remaining remediation alternatives that are available for use at the site.

No further action at the site is not a feasible alternative, based upon the results of the initial site investigation relative to the cleanup goals presented in Section 1.4. Therefore, this alternative will not be considered further. Natural attenuation at the site is not a feasible alternative since the bench test indicated that the heavy oil at the site will not degrade well and the chlorinated solvents present are also not expected to degrade.

Because the contamination is predominantly between depths of 10 and 220 feet below grade, remediating the entire site by excavation is not feasible. The volume of soil removed could exceed 25,000 cubic yards, which would be economically infeasible. In addition, this alternative is geotechnically infeasible, because the excavation would be too deep, particularly with Building 637N directly adjacent to the site. Therefore, this alternative will not be considered further.

Considering the site and soil characteristics, it will be assumed that 12 feet below grade, which is the EPA construction worker safety standard², is the maximum depth of excavation that is technically feasible. Excavation to this depth may be considered as a partial corrective measure. Therefore, the CAP will evaluate the appropriateness of excavating a more focused portion of the site, particularly the high concentrations of waste oil detected in relatively shallow soils.

Soil venting, though effective in removing volatile contaminants, would not be expected to remove the non-volatile portion of the contamination at the site, which represents most of the contamination detected in the subsurface. Therefore, this alternative will not be considered as a stand-alone solution, but rather as a portion of the bioventing technology described below.

Based on pilot tests completed at similar sites at TEAD, bioventing by air extraction would be effective in remediating the gasoline- and diesel-range hydrocarbons at 637N. However, the bench test results for waste oil-contaminated soil at 637N indicate that bioremediation is not an effective approach to treat the heavier fraction of contamination at the site. Therefore, this alternative will not be considered as an exclusive remediation option, but will be evaluated as a partial corrective action in combination with other alternatives.

Air injection could spread volatile contamination in the subsurface and potentially hasten migration to groundwater because subsurface soils are highly permeable. In addition, vapors could be forced into the adjacent building. Bioremediation by air injection would not be expected to reduce the chlorinated solvents at the site. Therefore, this alternative will not be considered further.

Surface capping is an appropriate corrective action for contaminants that are relatively insoluble and immobile in the absence of a driving force, which is typically rainfall. Generally, this includes heavier fuel hydrocarbons and PAHs, waste oils, tar, and metals. Since the site contains

² The minimum depth to which contaminated soil would not be expected to pose a risk to construction workers if subsurface utility work were performed at the site.

mobile, vapor-diffusive fuel and chlorinated hydrocarbons, this alternative will not be considered as an exclusive remediation option. This alternative will be considered as a partial corrective action in combination with other alternatives.

3.7 DETAILED ASSESSMENT OF REMEDIAL ALTERNATIVES

In accordance with DERR requirements for LUST site CAPs, Kleinfelder evaluated combinations of three remediation technologies. Evaluation criteria included: cost of installation, operation, and maintenance; feasibility based upon soil characteristics, extent of contamination, and contamination characteristics; and current and anticipated future land use. The following discussion was developed to follow CAP guidance and is presented for comparison purposes. The costing data should be considered to have an accuracy of plus or minus 50 percent, and are not intended to be used for budgetary purposes.

The following corrective action scenarios were considered:

- Excavation with Bioventing
 - Excavate laterally within the Level II RCL for contaminants of concern³, and 12 feet vertically. Biovent site to 220 feet below ground surface (bgs).
 - Excavate laterally within the Tier I screening level for contaminants of concern¹, and 12 feet vertically. Biovent site to 220 feet bgs.
- Capping with Bioventing
 - Cap within the Level II RCL of 300 mg/kg TRPH laterally. Biovent site to 220 feet bgs.

Comparisons of the remediation technologies considered follow:

3.7.1 Excavation with Bioventing

The excavation with bioventing option would involve physically removing the shallow, poorly degradable TRPH contamination and bioventing the deeper PAHs, diesel, and gasoline-range hydrocarbons. This option would also be expected to remove the low levels of chlorinated

³ For cost estimation purposes, it was assumed that the Level II RCL for TRPH of 300 mg/kg and the Tier I RBCA screening concentration for TRPH of 10,000 mg/kg are reasonable indications of the extent of all contaminants above the respective concentration limits. This extent estimate is presented in Plate 5.

solvents via vapor extraction. The bioventing portion could be implemented by utilizing the existing dual-nested deep vent well and operating at 200 scfm for 2 years. Monthly inlet/outlet sampling and weekly maintenance would be required for the bioventing system.

The excavation would be performed to remove contaminated soil to a depth of 12 feet bgs. Laterally, the excavation could remove soils to the Level II RCL concentration for contaminants of concern or the Tier I RBCA screening level. Excavated soil could be disposed of off site, or treated on site and returned to the excavation.

Cost

The details of the cost estimates are provided in Appendix D. Following are summaries of the estimated costs:

The estimated cost for bioventing and excavating the soil to the Level II RCL, treating the soil on site, and returning it to the excavation would be \$489,000. If the excavated soil was disposed and the excavation was backfilled with clean (imported) soil, the estimated cost would be \$510,000.

The estimated cost for bioventing and excavating the soil to the Tier I RBCA screening level, treating the soil on site, and returning it to the excavation would be \$444,000. If the excavated soil was disposed and the excavation was backfilled and with clean (imported) soil, the estimated cost would be \$451,000.

Feasibility

The bioventing would be efficient in remediating the volatile and degradable constituents, because the soils are highly permeable and the contaminants are aerobically degradable. With volatile hydrocarbons present in the subsurface, a significant amount of hydrocarbons could potentially be exhausted to the atmosphere during bioventing. To maintain State of Utah *de minimus* standards, the bioventing may have to be intermittent.

Several utilities are present beneath the surface in the 637N area, decreasing the feasibility of excavating a large area. Excavating the 3,000 ft² area necessary to meet the Level II RCL for TRPH would require significant effort and pose notable risks, considering the number of live utility lines within the target area.

Suitability to Current and Anticipated Future Land Use

Impact on the site from bioventing would be minimal, because bioventing is an in-situ technology. The remediation equipment could be completely removed and the wells could be abandoned. The bioventing portion would limit use of the site for approximately the operation time, estimated at 2 years.

The excavation would be completed before the bioventing portion. The site would be backfilled, re-graded, and restored at the surface, so the long-term impact to the site use would be negligible.

3.7.2 Capping with Bioventing

The bioventing portion of this corrective action option would be the same as the bioventing portion of the preceding option (Section 3.7.1., "Excavation with Bioventing"). The capping portion would involve applying a lining system just below the surface, held in place by a layer of indigenous backfill. The liner would be designed and finished to prevent rainfall from penetrating the subsurface underlying the finished grade. The cap would become a permanent fixture at the site, limiting the uses of the site to those that do not compromise the integrity of the cap. The site would be designated as a limited use area. A notification would be placed that details restrictions on site use and names contact persons.

Cost

The estimated cost to implement this corrective action option would be \$352,000. The details of the cost estimate are provided in Appendix D.

Feasibility

The feasibility of the bioventing portion is the same as that described for "Excavation with Bioventing" (Section 3.7.1).

Implementing the capping portion of this corrective action option is feasible; it would be expected to prevent mobility of heavier contamination, and construction would not be difficult. However, the future use of the site has not been defined. Depending upon the future use, the permanent use restrictions associated with this option could become a concern. Furthermore, this option would involve leaving the waste oil source area in place, which, considering the high

- Environmentally sound is the degree to which the alternative would be protective to human health and the environment if implemented. Examples of less sound applications would be air injection bioventing beneath a building with shallow volatile contamination, or natural attenuation of soil contamination at a site with mobile contaminants near groundwater.
- Suitability is the degree to which the selected technology's specific design (well design, equipment specifications, operation conditions, etc.), complies with the technical constraints inherent to the technology. Suitability also considers the degree to which the technology is technically appropriate relative to the extent and nature of the contamination and the site conditions and constraints. A example of a poorly suited technology would be air sparging in an existing monitoring well screened to 10 feet below the groundwater or soil venting in a network of existing ½" diameter pressure probes.
- Reliability defines how well the alternative can be expected to consistently and properly operate relative to design specifications throughout the proposed operation duration. The criterion is often a measure of the complexity of the application (more complex systems tend to have more down time) but is often closely tied to suitability (less suitably implemented systems are more likely operate poorly or break down).

The selected remediation technology is excavating to the Tier I RBCA screening level and bioventing the deeper soils. Excavated soil will be treated with off-site disposal which, though slightly more costly than on-site treatment, was considered more prudent considering the uncertainty of ex-situ treatment technologies (particularly considering the bench test results that indicated poor treatability of the waste oil at the site). This combination of technologies was selected because it is both feasible and implementable, based on site conditions and varied contaminants, and it is suitable and environmentally sound with respect to remediation goals. The Tier I excavation ranked higher than the Level II RCL excavation, primarily because of the significant difficulties expected with this site excavation in an industrial zone. The Level II RCL excavation will require digging up to the roadway and railroad around which several utilities are known to be convoluted. The selection strategy is summarized in the table below:

Table 6: Summary of Technology Selection Strategy

Remediation Alternative	Excavation to 12' bgs, Biovent Deep Soils		Cap Site, Biovent Deep Soils
	Excavate Laterally to Tier I RBCA	Excavate Laterally to Level II RCL	
Feasibility	4	3	3
Implementable	4	3	4
Economically Prudent	4	3	4
Historically Proven	4	4	4
Environmentally Sound	3	4	3
Suitability	4	3	3
Reliability	3	4	3
Average Score	3.7	3.4	3.4

The combined use of the technologies ranks high, because when collectively applied, the strategy capitalizes on individual strengths and reasonably overcomes individual weaknesses of each independent technology.

The selected treatment option for the excavated soil is disposing off-site and backfilling the excavation with clean (imported) soil. This was preferred because the added cost for the increased reliability was relatively low compared to the costs for ex-situ treatment alternatives.

4. CORRECTIVE ACTION DESIGN AND CONSTRUCTION DETAILS

4.1 DESIGN OF SELECTED REMEDIATION ALTERNATIVE

4.1.1 Excavation

4.1.1.1 Initiation Strategy

Soil in the source area containing petroleum hydrocarbons greater than 50,000 mg/kg will be excavated for off-site disposal at a Class II landfill. Prior to beginning excavation, a comprehensive utility clearance will be performed. After clearing and grubbing exposes the excavation area, the soil within the excavation limits will be removed with a hydraulic excavator and transported with 10-wheel dump trucks. During excavation activities, hand probing and digging will be used to expose utility lines within the excavation.

4.1.1.2 Advancement and Sampling Strategy

Excavation will proceed from vent well VW-1 outward on the basis of field observation and screening, as illustrated on Plate 6. After the excavation limits are reached, confirmation soil samples will be collected to evaluate the remaining soil in place. One soil sample will be collected for each 100 square feet of exposed surface. The exposed surface will be conceptually divided into a grid of approximately 100-square foot sections, and a discrete sample will be collected from a randomly chosen location within each section.

4.1.1.3 Confirmation Process

The confirmation soil samples will be lithologically logged and qualitatively screened for organic vapors using a photo-ionization detector (PID). The samples will be submitted to a USACE - certified laboratory for the following analyses:

- Total Purgeable Petroleum Hydrocarbons (EPA Method 8015M)
- Total Extractable Petroleum Hydrocarbons (EPA Method 8015M)

4.1.1.4 Health and Safety

Petroleum hydrocarbons are present in varying concentrations at the site. A site safety plan (SSP) will be prepared for the excavation portion of the CAP and will include a discussion of procedure safety, personnel protection, site controls, and air monitoring. The project manager will be responsible for implementing the SSP.

4.1.1.5 Backfill Soil

If an appropriate fill material is not available at TEAD, excavation backfill will be completed with aggregate base rock. Fill shall meet the gradation requirements of the COE Guide Specifications for Military Construction, July 1993, and the COE Construction Control Manual, June 1989. Backfill with aggregate base rock will progress to finish grade.

4.1.1.6 Compaction

The backfill soil will be placed in horizontal loose lifts that have a maximum thickness of 8 inches, and compacted to a minimum of 90 percent of the relative compaction as determined by ASTM test method 1557-91. The moisture content of the backfill soil will be set at $\pm 2\%$ of optimum.

4.1.1.7 Surface Completion

Upon completion of backfilling activities, the surface grade of the area will be restored. Surface features such as asphalt paving, the concrete ramp to Building 637, and, if needed, the railroad tracks will be re-installed.

4.1.2 Bioventing System

The bioventing portion was designed based on information provided in the site investigation, results of the deep and shallow respiration tests, and the bench-scale degradability test discussed above. The bioventing portion of the CAP plan is anticipated to last for two years. The sections that follow describe the design details for the system.

4.1.2.1 Vent Well

Vent well VW-1, previously constructed at the site, will be used to provide the necessary ventilation to the subsurface. The dual-nested vent well is constructed of 4-inch diameter schedule 40 PVC pipe in the deep zone, screened from 120 to 170 feet and from 230 to 260 feet. A second 2-inch schedule 40 PVC pipe is screened in the shallow zone from 40 to 60 feet below grade. The vent well location is shown on Plate 7, and a construction schematic is shown on Plate 8.

4.1.2.2 Wellhead and Piping

The wellhead will be completed with a 3-inch minimum PVC tee on each screen run that will reduce to a 1/4-inch threaded port at the top for sampling, and to a PVC ball valve on the lateral run. A pressure gauge will be threaded into the side of each tee for pressure monitoring, and a 1/4-inch threaded port will be included approximately 12 inches down from the valve for flow monitoring. The two screen runs will be connected together and will lead to the ventilation blower via 3-inch PVC hose. The stub-in to the blower will be equipped with ports to measure flow velocities, a valve to introduce dilution air for pressure control, and a port to measure collective inlet concentrations. The layout of the piping is shown on Plate 7.

4.1.2.3 Trenching Layout (If Needed)

If desired by TEAD for aesthetic reasons, the wellhead and piping could be placed below ground with the final feed stubbed up in the equipment area. Piping could be placed in 1-foot wide by 2-foot deep trenches, and wellheads secured in 2-foot by 2-foot utility boxes.

4.1.2.4 Above-Ground Equipment

The inlet header from the vent well will lead through a moisture separator and particulate filter to the blower. From the blower, the outlet will exhaust to the atmosphere. The vent well is expected to reach a total flow of 160 to 200 scfm under normal operating conditions. During rainy periods or snow melt, flow may be reduced to 130 to 150 scfm. On the basis of Kleinfelder's experience with the similar pilot-scale systems, the vent well will require 60 to 80 inches of water (in wc) vacuum to maintain the desired flow. The flow may be generated by a single 200 scfm skid-mounted blower or the two existing 100 scfm blowers.

The blower and moisture separator will be wired to a central control panel and interlocked to a remote notification system. The control panel and the motor starter for the blower mounted outside the control panel should be weatherproof NEMA 12. The notification system will page designated system operators in the event of a system shutdown. The entire system will shut down if an upset occurs at the blower or if excessive moisture accumulates in the knockout drum.

Flow rates from the individual screens will be monitored with a portable anemometer through sample ports installed at the wellhead. Vacuums will be recorded with gauges mounted at the wellhead. All readings will be recorded on data sheets during site visits and summarized in monthly progress reports.

4.1.2.5 Site Security

The vent well and remediation equipment shall be placed within security fencing (minimum 6 feet high) in the specified treatment area (Plate 7). When system operators are not on site or when monitoring is not taking place, the entry gate will remain locked.

4.2 OPERATION AND MAINTENANCE OF BIOVENTING SYSTEM

4.2.1 Maintenance Schedule

The bioventing system should be visited weekly during the first 3 months of operation and monthly thereafter, for the purposes of monitoring and equipment maintenance. The table below shows an appropriate monitoring schedule for the system.

System Component	Parameter	Method	Frequency*
Vent Well	Flow	Thermal Anemometer	Weekly/Monthly
	Vacuum	Pressure Gauge	Weekly/Monthly
	Temperature	Portable Thermometer	Weekly/Monthly

* Weekly for the first 3 months, monthly thereafter

4.2.2 System Sampling

Specific components of the bioventing system should be sampled regularly. The sampling protocol will serve the following objectives:

- determine the ongoing oxygen demand of the subsurface and carbon dioxide production;
- locate where the oxygen demand is, and if applicable, from where the contamination is being removed (i.e., which screened interval); and
- if contamination is being removed, ensure compliance with *de minimus* limits.

Sampling should be completed by using a portable flame ionization detector (FID) and an infrared gas analyzer (IGA), and supplemented by laboratory analysis if TPH are detected above 100 ppm in the system outlet. The sampling methods and frequencies are shown the table below:

System Component	Sample Method	Frequency*
Vent Well	FID Reading	Weekly/Monthly
	O ₂ and CO ₂ by IGA	Weekly/Monthly
	TO-3 w/BTEX	Monthly

* Weekly for the first 3 months, monthly thereafter; TO-3 with BTEX should be sampled if FID reading is greater than 100 ppm

4.2.3 Flame Ionization Detector/Infrared Gas Analyzer Sampling

The FID will measure combustible constituents in soil vapor samples. A standard FID will detect most of the petroleum hydrocarbon constituents present at 637N. The FID readings obtained will be used as indicators of the magnitude of contamination (if any) being exhausted by the system.

The IGA will measure the percent of oxygen and carbon dioxide in the soil gas. The IGA readings obtained will be used as indicators of the oxygen demand and carbon dioxide generation, which can be used for evaluating the degree of in-situ petroleum hydrocarbon degradation. This will allow tracking of progress, allow continuing optimization by concentrating remediation efforts on specific screened intervals, and confirm that emissions are within *de minimus* limits through the exhaust stack.

4.2.4 Laboratory Air Sampling

If FID concentrations in the exhaust stack are above 100 ppm, laboratory air sampling for TPH,

benzene, toluene, ethylbenzene, and total xylenes (BTEX) should be completed using one-liter Summa canisters. One EPA Method TO-14 sample for chlorinated solvents should be collected at startup. If necessary, TO-14 samples should continue on a monthly basis if any contaminants are above 100 ppm.

Occasional analytical sampling for oxygen and carbon dioxide is recommended to confirm the IGA results. Results will be used for emission compliance, instrument confirmation, and for a more quantitative indication of contaminant concentrations.

4.3 DISCUSSION OF ASSESSMENT CRITERIA AND OPTIMIZATION

The objective of this section is to provide criteria to track general system dynamics and evaluate the effectiveness of the bioventing operation. The discussion includes recommendations for modifications and avenues for optimizing the system.

4.3.1 Oxygen Utilization and Contaminant Removal Rates

The oxygen, carbon dioxide, and contaminant concentration at the system outlet will be used to estimate the amount of hydrocarbons degraded and potentially removed by the system. The total flow rate of the system shall be compared with the concentrations of the extracted gas to estimate the pounds of oxygen consumed, carbon dioxide produced, and contaminants removed during the period of operation. The rate shall be calculated as follows:

$$Q_m = K(q_a \cdot c_a)$$

where,

- Q_m = Mass removal rate (lbs/day)
- q_a = System flow rate (scfm)
- c_a = Concentration in air stream, in the case of oxygen the concentration deficit from background ($\mu\text{g/L}$)
- K = Conversion factor ($9.0\text{e-}5 \text{ min-l-lb/day-ft}^3 \cdot \mu\text{g}$)

Similarly, sampling of the screened intervals and corresponding flow rates will be used to determine chemical dynamics in the deep and shallow zones. Optimizations resulting from these data may include concentrating the system within those portions of the screened interval with the greatest oxygen demand.

Monthly reports will include the most current estimate of total mass of contaminants degraded and removed and corresponding optimizations that resulted. Removal rates of contaminants (if present) will be evaluated closely and regularly for compliance with exhaust limits.

4.3.2 Accumulation of Entrained Water

During periods of rainfall or snowmelt, the system could collect water vapor during operation. The water vapor will be separated from the soil vapor in a 55-gallon moisture knockout drum. Entrained water may be handled by transporting it off site for disposal by a state-permitted treatment and disposal facility. A total of two water samples should be analyzed for TPH/BTEX and halogenated volatiles to characterize the liquid and facilitate proper disposal. Based on previous similar systems at TEAD, no more than 100 gallons per week of entrained liquid are expected to be generated during periods of heavy rainfall.

If excessive moisture entrainment becomes a problem, an option would be to modify the system by introducing dilution air at the manifold, thus reducing the overall pressure and flow rate of the bioventing system during heavy rainfall/snow-melt. Reducing flow at a problematic screened interval (likely the shallow screen) may also alleviate the condition.

4.4 PROGRESS TOWARD REMEDIATION GOALS

The overall goal of the CAP is to reduce or mediate soil contamination at the site so that it does not pose a threat to human health or the environment. Assuming the excavation is carried out as proposed and the integrity of the cap is maintained, the goal of the CAP for this portion of the remedy would be achieved when the excavation and capping are completed.

For the bioventing portion, inlet concentration dynamics would indicate how much and how quickly the contaminants are being degraded or removed. The behavior of subsurface oxygen demand, carbon dioxide production, and contaminant removal characteristics would indicate when confirmation sampling is appropriate. When continued operation of the remediation system does not result in significant additional contaminant degradation or removal, confirmation sampling should be performed.

5. PERMITTING REQUIREMENTS

Kleinfelder anticipates that TEAD will likely require an Excavation Permit for excavating that may be necessary for subsurface investigation or remedial construction.

Kleinfelder will file appropriate applications to obtain permits and/or waivers. If agencies other than those listed above require permits, Kleinfelder will file additional applications as necessary. Copies of permits/waivers will be maintained on site, and copies will be forwarded to the DERR project manager.

6. PUBLIC NOTIFICATION

The DERR requires notification of potentially affected public before implementing a corrective action. The population potentially affected by the 637N corrective action consists of individuals working or having specific business at the former Maintenance and Supply Area. However, depending upon the timing of the forthcoming BRAC property transfer, coordination with the City of Tooele and/or the Endeavor Development Group will also be likely. Currently, most of the area is vacant and few employees are present. The potentially affected population is estimated at 100 to 3,000 people.

A public notice of intent to implement the CAP will be placed in the local *Tooele Transcript Bulletin*. Additionally, copies of the notice will be posted at conspicuous locations on site. The proposed notice follows:

PUBLIC NOTICE

Corrective Action: Facility Identification No. 8000047, Release Site EIPL. The Tooele Army Depot will be remediating an underground storage tank release site at the northwest corner of Building 637 on the Tooele Army Depot. Elevated concentrations of petroleum hydrocarbons were detected in soils in this area during subsurface investigations conducted in 1995 and 1997. The petroleum hydrocarbons will be removed from the soils using a combination of excavation and bioventing. The Corrective Action Plan, which describes the site contaminants and the proposed remediation techniques, may be reviewed at the Utah Department of Environmental Quality, 168 North 1950 West, Salt Lake City. For additional information, you may contact Larry McFarland at the Tooele Army Depot, Environmental Management Office, or Mike Pecorelli at the Utah Division of Environmental Response and Remediation.

7. REFERENCES

1. Kleinfelder, Inc., 1997. "Monitoring Well C-16 Completion Report, Tooele Army Depot (TEAD), Tooele, Utah."
2. Kleinfelder, Inc. and Jacobs Engineering Group, 1996. "Initial Site Characterization and Subsurface Investigation Report, Building 637 North LUST Site, Tooele Army Depot North Area, Tooele, Utah, DERR/UST Facility I.D. #8000047, DERR Release Site EIPL." January 25, 1996.
3. Kleinfelder, Inc. and U.S. Army Corps of Engineers, 1996. "Project Workplans, Additional Subsurface Characterization, Building 637-N, 637-SW, 637-SE and 691 LUST Sites, Tooele Army Depot (TEAD), Tooele, Utah." December 12, 1996.
4. State of Utah, Department of Environmental Quality, Division of Environmental Response and Remediation, 1996. "Leaking Underground Storage Tank (LUST) Corrective Action Plan Report Guide." August 1996.

TABLE 1
SUMMARY OF COMPOUNDS DETECTED
UST EXCAVATION SOIL SAMPLES
BUILDING 637 NORTH LUST SITE

Sample Designation	Sample Location	Oil and Grease (mg/kg)	2-Methylnaphthalene (mg/kg)	Naphthalene (mg/kg)	Phenanthrene (mg/kg)	Pyrene (mg/kg)	bis(2-ethylhexyl)phthalate (mg/kg)
Sample #1*	Bottom	702	NA	NA	NA	NA	NA
Sample #2*	Bottom	494	NA	NA	NA	NA	NA
Sample #TN100694-01**	Sidewall	NA	18.0J	<25.0	6.0J	<25.0	2.5J
Sample #TN100694-02**	Bottom	NA	<5.0	<5.0	<5.0	<5.0	<5.0

* Samples collected October 1994 by England Construction Company.

** Samples collected October 1994 by Kleinfelder, Inc.

NA = Not Analyzed

J = Detected, but below limit of quantification.

Oil and grease analyzed by EPA Method 418.1; all other compounds analyzed by EPA Method 8270.

TABLE 2A
SOIL SAMPLE ANALYTICAL RESULTS*
1995 INITIAL SITE CHARACTERIZATION - TRPH AND METALS
BUILDING 637 NORTH LUST SITE

Sample Location	FID (ppm)	TRPH as Oil & Grease	Barium	Cadmium	Chromium	Lead	Silver	Arsenic	Mercury	Selenium
SB-01 9.5-11.5	1,000	129	14.5	<1.5	5.0	7B	<2.5	0.81B	0.4	0.4B
SB-01 17-19	NA	62,700	92.7	<1.5	14.7	7B	<2.5	2.04	0.4	0.8B
SB-01 32-33	500	16,000	20.0	<1.5	8.0	5B	<2.5	1.39	0.3	<0.6
SB-02 14.5-16.5	NA	4,350	63.7	0.5B	14.2	<20	0.8B	1.51	0.08B	0.3B
SB-02 19.5-21.5	10,000	13,900	42.0	<1.5	12.4	8B	<2.5	2.42	<0.2	1.0
SB-03 9.5-11.5	>10,000	51,700	18.4	<1.5	6.0	<20	<2.5	1.09B	0.09B	<0.6
SB-03 9.5-11.5	>10,000	33,600	22.2	<1.5	8.9	<20	<2.5	1.35	<0.2	<0.6
SB-03 19.5-21.5	5,000	62,400	108	<1.5	12.6	8B	<2.5	3.20	0.07B	<0.6
SB-03 29.5-31.5	1,200	11,600	40.3	<1.5	10.9	<20	<2.5	2.08	0.06B	0.4B
SB-04 9.5-11.5	5	11B	26.4	<1.5	5.3	5B	<2.5	<20*	0.1B	<40
SB-04 19.5-21.5	300	13	72.1	0.5B	6.0	9B	<2.5	<20*	0.3B	<40
SB-04 30-40	40	14	134	0.8B	13.3	16B	<2.5	5B*	0.2B	<40
SB-04 38-40	40	14	105	0.7B	10.9	12B	<2.5	<20*	0.2B	<40
SB-05 8-10	2,000	1,930	25.6	0.5B	5.4	8B	<2.5	<20*	0.1B	<40
SB-05 18-20	4,000	25,700	16.1	0.5B	6.9	6B	<2.5	4B*	0.2B	<40
SB-06 9.5-11.5	80	119	22.4	0.6B	9.1	11B	<2.5	<20*	0.3B	<40
SB-06 29.5-31.5	800	4,650	16.4	0.5B	9.5	6B	<2.5	<20	0.2B	<40
SB-07 9.5-11.5	150	34	20.4	0.4B	5.9	6B	<2.5	4B	0.2B	<40
SB-07 24.5-26.5	90	47	56.8	<1.5	5.6	8B	<2.5	5B	0.3B	<40
SB-07 38-40	10	21	99.9	0.8B	10.2	10B	<2.5	4B	0.1B	<40
SB-08 8-10	40	20	15.0	0.8B	5.7	<20	<2.5	0.77B	0.09B	<0.6
SB-08 19.5-21.5	450	13	112	0.8B	14.4	10B	<2.5	1.40B	0.1B	<0.6
SB-08 39.5-41.5	150	15	83.9	<1.5	7.5	<20	0.8B	1.34B	0.1B	<0.6

TABLE 2A
SOIL SAMPLE ANALYTICAL RESULTS*
1995 INITIAL SITE CHARACTERIZATION - TRPH AND METALS
BUILDING 637 NORTH LUST SITE

Sample Location	FID (ppm)	TRPH as Oil & Grease	Barium	Cadmium	Chromium	Lead	Silver	Arsenic	Mercury	Selenium
SB-09 9.5-11.5	1,000	7,660	26.6	1.1B	8.8	<20	<2.5	0.73B	0.08B	<0.6
SB-09 9.5-11.5	1,000	7,150	29.1	0.8B	8.2	4B	<2.5	0.56B	0.08B	<0.6
SB-09 19-21	1,200	9,190	76.9	0.7B	10.4	7B	<2.5	0.95B	0.10B	<0.6
SB-10 39-41	800	10B	122	0.4B	7.2	<20	1.4B	1.49B	0.09B	<0.6
SB-11 44.5-46.5	175	14	76.2	0.6B	11.2	7B	<2.5	1.06B	0.10B	<0.6
SB-08 8-10	40	20	15.0	0.8B	5.7	<20	<2.5	0.77B	0.09B	<0.6

* Results in milligrams per kilogram, except as noted otherwise.

FID = Flame Ionization detector (headspace reading)

TRPH analyses by EPA Method 418.1 Arsenic by EPA 7061A,

Mercury by EPA 7471, Selenium by EPA 7741, or EPA 6010A

All other metals by EPA 6010A.

B = Detected below the limit of quantitation but above the method detection limit

NA = Not analyzed

TABLE 2C
SOIL SAMPLE ANALYTICAL RESULTS*
1995 INITIAL SITE CHARACTERIZATION
SEMI-VOLATILE ORGANIC COMPOUNDS
BUILDING 637 NORTH LUST SITE

Sample Location	SB-03, 19.5'-21.5'	SB-03, 29.5'-31.5'
Acenaphthene	5.0	2.1J
4-Aminobiphenyl	<3.3	4.5
Benz(a)anthracene	20.9	5.6
Benzo(b)fluoranthene	11.1	2.9J
Benzo(k)fluoranthene	11.0	3.0J
Benzo(a)pyrene	25.2	6.6
2-Chloronaphthalene	<3.3	0.6J
Chrysene	52.3	<12.7
Dibenzofuran	2.1J	1.0J
Dibenz(a,h)anthracene	3.0J	<3.3
3,3-Dimethylbenzidine	<3.3	1.7J
7,12-Dimethylbenz(a)anthracene	68.7	8.5
Fluoranthene	5.8	1.4J
Fluorene	8.7	3.3
3-Methylcholanthrene	9.6	2.0J
2-Methylnaphthalene	55.1	20.7
Naphthalene	12.6	4.4
2-Nitroaniline	<17.0	0.5J
N-Nitrosodiphenylamine	12.9	4.8
Phenanthrene	69.9	17.1
Pyrene	39.7	9.5

* Results in milligrams per kilogram; only compounds detected are shown.

J: Detected, but below limit of quantification.

Only compounds detected are shown.

April 3, 1998

Table 3
Soil Sample Analytical Results
Building 637N - LUST Site
Tooele Army Depot

Sample Location	Depth (ft.)	Sample ID	Sample Date	Analysis Date	Method	Constituent Name	Result	Reporting Limit	Units	PID (ppmv)
VW-1	38	U3SP-0404-01	4/4/97	4/18/97	EPA 8015M/LUFT	Diesel C12-C22	5700	120	mg/Kg	59
VW-1	38	U3SP-0404-01	4/4/97	4/18/97	EPA 8015M/LUFT	Other components below reporting limits				59
VW-1	38	U3SP-0404-01	4/4/97	4/16/97	EPA 8015M/5030	Gasoline C4-C12	180	60	mg/Kg	59
VW-1	38	U3SP-0404-01	4/4/97	4/16/97	EPA 8015M/5030	Other components below reporting limits				59
VW-1	38	U3SP-0404-01	4/4/97	4/17/97	EPA 8260	Total Xylenes	0.82	0.15	mg/Kg	59
VW-1	38	U3SP-0404-01	4/4/97	4/17/97	EPA 8260	Ethylbenzene	0.47	0.3	mg/Kg	59
VW-1	38	U3SP-0404-01	4/4/97	4/17/97	EPA 8260	Naphthalene	3.4	2	mg/Kg	59
VW-1	38	U3SP-0404-01	4/4/97	4/17/97	EPA 8260	Other analytes below reporting limits				59
VW-1	38	U3SP-0404-01	4/4/97	4/25/97	EPA 8270A	Benzo(a)pyrene	4.6	4	mg/Kg	59
VW-1	38	U3SP-0404-01	4/4/97	4/25/97	EPA 8270A	Chrysene	8.1	4	mg/Kg	59
VW-1	38	U3SP-0404-01	4/4/97	4/25/97	EPA 8270A	Pyrene	6.8	4	mg/Kg	59
VW-1	38	U3SP-0404-01	4/4/97	4/25/97	EPA 8270A	Phenanthrene	10	4	mg/Kg	59
VW-1	38	U3SP-0404-01	4/4/97	4/25/97	EPA 8270A	2-Methylnaphthalene	7.4	4	mg/Kg	59
VW-1	38	U3SP-0404-01	4/4/97	4/25/97	EPA 8270A	Other analytes below reporting limits				59
VW-1	45	U3SP-0404-02	4/4/97	4/17/97	EPA 300.0	Analytes below reporting limits				101
VW-1	45	U3SP-0404-02	4/4/97	4/23/97	EPA 351.4	Total Kjeldahl Nitrogen	160	130	mg/Kg	101
VW-1	45	U3SP-0404-02	4/4/97	4/22/97	EPA 365.2	Analytes below reporting limits				101
VW-1	45	U3SP-0404-02	4/4/97	4/16/97	EPA 6010A	Iron	6100	6.5	mg/Kg	101
VW-1	45	U3SP-0404-02	4/4/97	4/16/97	EPA 6010A	Other analytes below reporting limits				101
VW-1	45	U3SP-0404-02	4/4/97	4/18/97	EPA 8015M/LUFT	Diesel C12-C22	7700	650	mg/Kg	101
VW-1	45	U3SP-0404-02	4/4/97	4/18/97	EPA 8015M/LUFT	Other components below reporting limits				101
VW-1	45	U3SP-0404-02	4/4/97	4/15/97	EPA 8015M/5030	Gasoline C4-C12	520	130	mg/Kg	101
VW-1	45	U3SP-0404-02	4/4/97	4/15/97	EPA 8015M/5030	Other components below reporting limits				101
VW-1	45	U3SP-0404-02	4/4/97	4/17/97	EPA 8260	Total Xylenes	2.3	0.22	mg/Kg	101
VW-1	45	U3SP-0404-02	4/4/97	4/17/97	EPA 8260	Toluene	0.5	0.43	mg/Kg	101

Notes:

PID = Photoionization detector (headspace reading); NM = not measured, ND = not detected.

23-900023-A13/2317R856

Table 3
Soil Sample Analytical Results
Building 637N - LUST Site
Tooele Army Depot

Sample Location	Depth (ft.)	Sample ID	Sample Date	Analysis Date	Method	Constituent Name	Result	Reporting Limit	Units	PID (ppmv)
VW-1	45	U3SP-0404-02	4/4/97	4/17/97	EPA 8260	Ethylbenzene	0.76	0.43	mg/Kg	101
VW-1	45	U3SP-0404-02	4/4/97	4/17/97	EPA 8260	Naphthalene	4.9	2.2	mg/Kg	101
VW-1	45	U3SP-0404-02	4/4/97	4/17/97	EPA 8260	Other analytes below reporting limits				101
VW-1	45	U3SP-0404-02	4/4/97	4/25/97	EPA 8270A	2-Methylnaphthalene	5.5	4.3	mg/Kg	101
VW-1	45	U3SP-0404-02	4/4/97	4/25/97	EPA 8270A	Phenanthrene	4.7	4.3	mg/Kg	101
VW-1	45	U3SP-0404-02	4/4/97	4/25/97	EPA 8270A	Other analytes below reporting limits				101
VW-1	115	U3SP-0405-02	4/5/97	4/18/97	EPA 8015M/LUFT	Diesel C12-C22	9200	610	mg/Kg	13.4
VW-1	115	U3SP-0405-02	4/5/97	4/18/97	EPA 8015M/LUFT	Other components below reporting limits				13.4
VW-1	115	U3SP-0405-02	4/5/97	4/16/97	EPA 8015M/5030	Gasoline C4-C12	210	61	mg/Kg	13.4
VW-1	115	U3SP-0405-02	4/5/97	4/16/97	EPA 8015M/5030	Other components below reporting limits				13.4
VW-1	115	U3SP-0405-02	4/5/97	4/17/97	EPA 8260	Total Xylenes	0.49	0.15	mg/Kg	13.4
VW-1	115	U3SP-0405-02	4/5/97	4/17/97	EPA 8260	Naphthalene	6	1.5	mg/Kg	13.4
VW-1	115	U3SP-0405-02	4/5/97	4/17/97	EPA 8260	Other analytes below reporting limits				13.4
VW-1	115	U3SP-0405-02	4/5/97	4/23/97	EPA 8270A	Analytes below reporting limits				13.4
VW-1	215	U3SP-0407-02	4/7/97	4/18/97	EPA 8015M/LUFT	Diesel C12-C22	88	5.2	mg/Kg	<1.9
VW-1	215	U3SP-0407-02	4/7/97	4/18/97	EPA 8015M/LUFT	Other components below reporting limits				<1.9
VW-1	215	U3SP-0407-02	4/7/97	4/15/97	EPA 8015M/5030	Components below reporting limits				<1.9
VW-1	215	U3SP-0407-02	4/7/97	4/12/97	EPA 8260	Acetone	0.012	0.01	mg/Kg	<1.9
VW-1	215	U3SP-0407-02	4/7/97	4/12/97	EPA 8260	Other analytes below reporting limits				<1.9
VW-1	215	U3SP-0407-02	4/7/97	4/17/97	EPA 8270A	Bis(2-ethylhexyl)phthalate	3	0.34	mg/Kg	<1.9
VW-1	215	U3SP-0407-02	4/7/97	4/17/97	EPA 8270A	Other analytes below reporting limits				<1.9
VW-1	300	U3SP-0408-03	4/8/97	4/18/97	EPA 8015M/LUFT	Components below reporting limits				NM
VW-1	300	U3SP-0408-03	4/8/97	4/15/97	EPA 8015M/5030	Components below reporting limits				NM
VW-1	300	U3SP-0408-03	4/8/97	4/12/97	EPA 8260	Acetone	0.031	0.011	mg/Kg	NM

Notes:

PID = Photoionization detector (headsapce reading); NM = not measured, ND = not detected.

23-900023-A13/2317R856

Table 3
Soil Sample Analytical Results
Building 637N - LUST Site
Tooele Army Depot

Sample Location	Depth (ft.)	Sample ID	Sample Date	Analysis Date	Method	Constituent Name	Result	Reporting Limit	Units	PID (ppmv)
VW-1	300	U3SP-0408-03	4/8/97	4/12/97	EPA 8260	Other analytes below reporting limits				NM
VW-1	300	U3SP-0408-03	4/8/97	4/17/97	EPA 8270A	Analytes below reporting limits				NM
C-17	330	U3SP041701	4/17/97	4/30/97	EPA 8015M/LUFT	Components below reporting limits				ND
C-17	330	U3SP041701	4/17/97	4/29/97	EPA 8015M/5030	Components below reporting limits				ND
C-17	330	U3SP041701	4/17/97	4/25/97	EPA 8260	Acetone	0.024	0.01	mg/Kg	ND
C-17	330	U3SP041701	4/17/97	4/25/97	EPA 8260	Other analytes below reporting limits				ND
C-17	330	U3SP041701	4/17/97	5/6/97	EPA 8270A	Analytes below reporting limits				ND
C-17	345	U3SP041801	4/18/97	4/30/97	EPA 8015M/LUFT	Components below reporting limits				ND
C-17	345	U3SP041801	4/18/97	4/29/97	EPA 8015M/5030	Components below reporting limits				ND
C-17	345	U3SP041801	4/18/97	4/25/97	EPA 8260	Analytes below reporting limits				ND
C-17	345	U3SP041801	4/18/97	5/5/97	EPA 8270A	Analytes below reporting limits				ND
C-17	350	U3SP041802	4/18/97	4/30/97	EPA 8015M/LUFT	Components below reporting limits				ND
C-17	350	U3SP041802	4/18/97	4/29/97	EPA 8015M/5030	Components below reporting limits				ND
C-17	350	U3SP041802	4/18/97	4/25/97	EPA 8260	Acetone	0.013	0.011	mg/Kg	ND
C-17	350	U3SP041802	4/18/97	4/25/97	EPA 8260	Other analytes below reporting limits				ND
C-17	350	U3SP041802	4/18/97	5/5/97	EPA 8270A	Analytes below reporting limits				ND

Notes:

PID = Photoionization detector (headsapce reading); NM = not measured, ND = not detected.
23-900023-A13/2317R856

TABLE 5
COMPARISON OF RECOMMENDED CLEANUP LEVELS⁽¹⁾
HEALTH RISK-BASED SCREENING LEVELS⁽²⁾, AND SITE CONCENTRATIONS OF
PETROLEUM CONSTITUENTS (mg/kg)

Constituent	RCL Level II Sensitivity Site	Tier 1 Screening Level	Max. Site Concentration ⁽³⁾	Sample Location ⁽⁵⁾	Sample Depth ⁽⁵⁾ (ft)
Benzene	0.300	0.9	926 ⁽⁴⁾	SB-05	18-20
Toluene	300	61	2.1 ⁽⁴⁾	SB-05	8-10
Ethylbenzene	200	23	1,020 ⁽⁴⁾	SB-09	19-21
Xylenes	3,000	235	56.7 ⁽⁴⁾	SB-05	8-10
Naphthalene	5.0	10	12.6 ⁽⁴⁾	SB-03	19.5-21.5
TPH as gasoline (TVPH)	100	1,500	3,900 ⁽⁴⁾	SB-05	8-10
TPH as diesel (TEPH)	300	5,000	9,200 ⁽⁶⁾	VW-1	115
Waste Oil (TRPH)	300	10,000	62,700 ⁽⁴⁾	SB-01	17-19

EVALUATION OF SITE RANKING CRITERIA
RELEASE SITE EIPL
BUILDING 637 NORTH LUST SITE

Site-Specific Factors	Site Data	Ranking Score
Distance to groundwater (feet)	>300	0
Native soil type	High permeability	20
Annual Precipitation	10 to 20 inches	5
Distance to nearest municipal production well (feet)	1,320 to 5,280	8
Distance to other wells (feet)	>1,320	0
Distance to surface water (feet)	>1,000	0
Affected Populations	100-3,000	10
Presence of nearby utility conduits	Present	15
TOTAL	--	58

Level I Sensitivity - greater than 65 points

Level II Sensitivity - 40 to 65 points

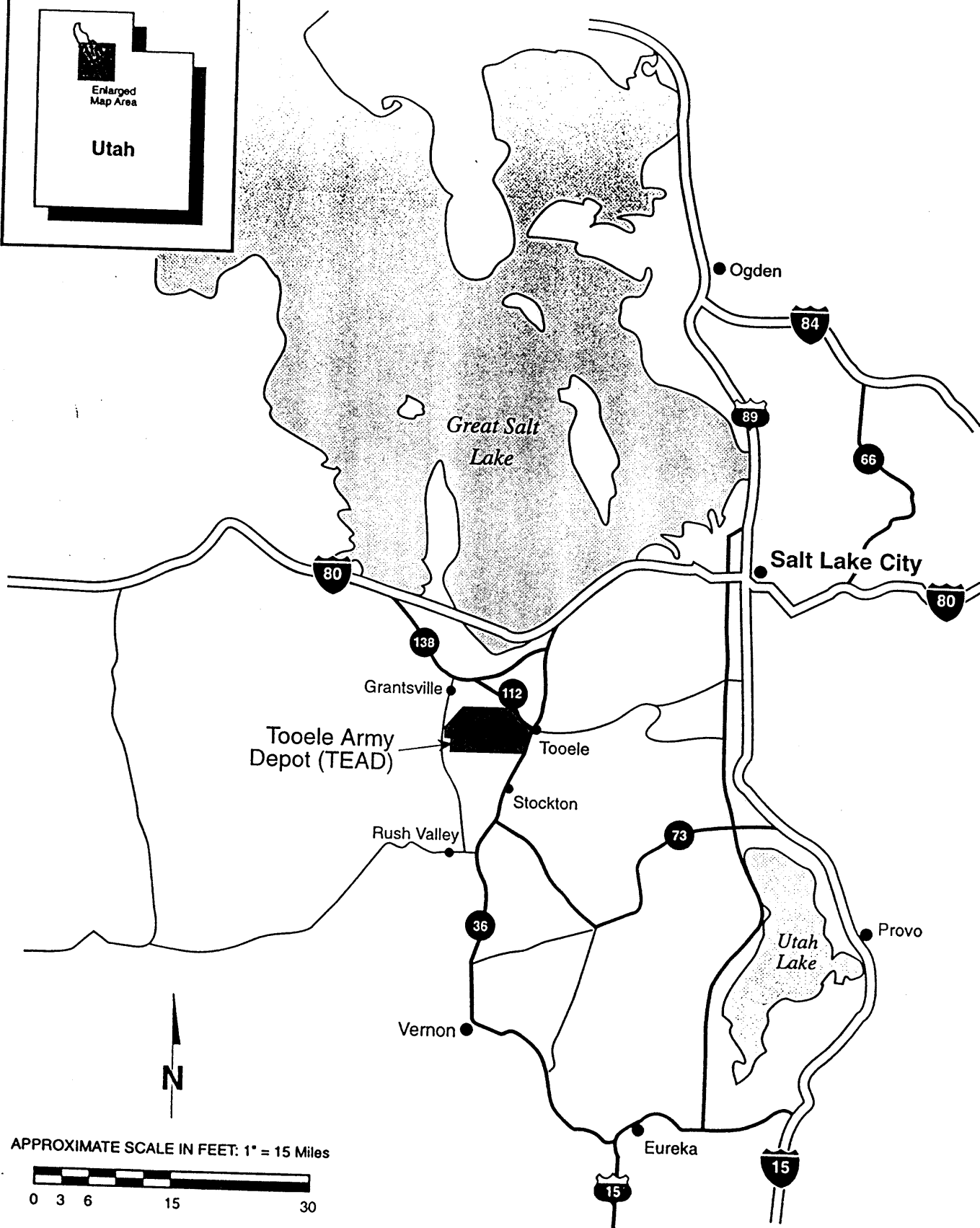
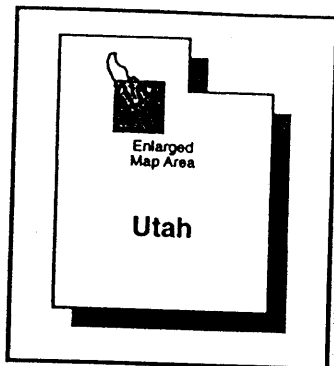
Level III Sensitivity - less than 40 points

Notes:

- (1) Recommended Cleanup Levels (RCLs): DERR criteria based upon site sensitivity, ranked (Level II) as shown on "Evaluation of Site Ranking Criteria", above.
- (2) Health Risk-Based Screening Levels: DERR criteria based upon Tier 1 risk - based corrective action.
- (3) Maximum concentration of constituent detected in soil samples collected during 1995 and 1997 site investigations.
- (4) Kleinfelder, 1996, "Initial Site Characterization and Subsurface Investigation Report, Building 637 North LUST Site."
- (5) Location and depth where maximum site concentration was detected.
- (6) Kleinfelder, 1997, "Supplemental Subsurface Investigation" (included as "Appendix B" of this CAP).

APPENDIX A

PLATES



KLEINFELDER

Drawn By: M. Bussanich
Project No. 23-900023-A12

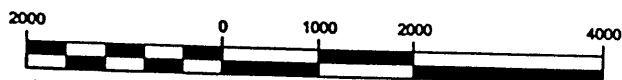
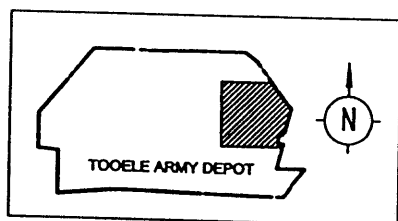
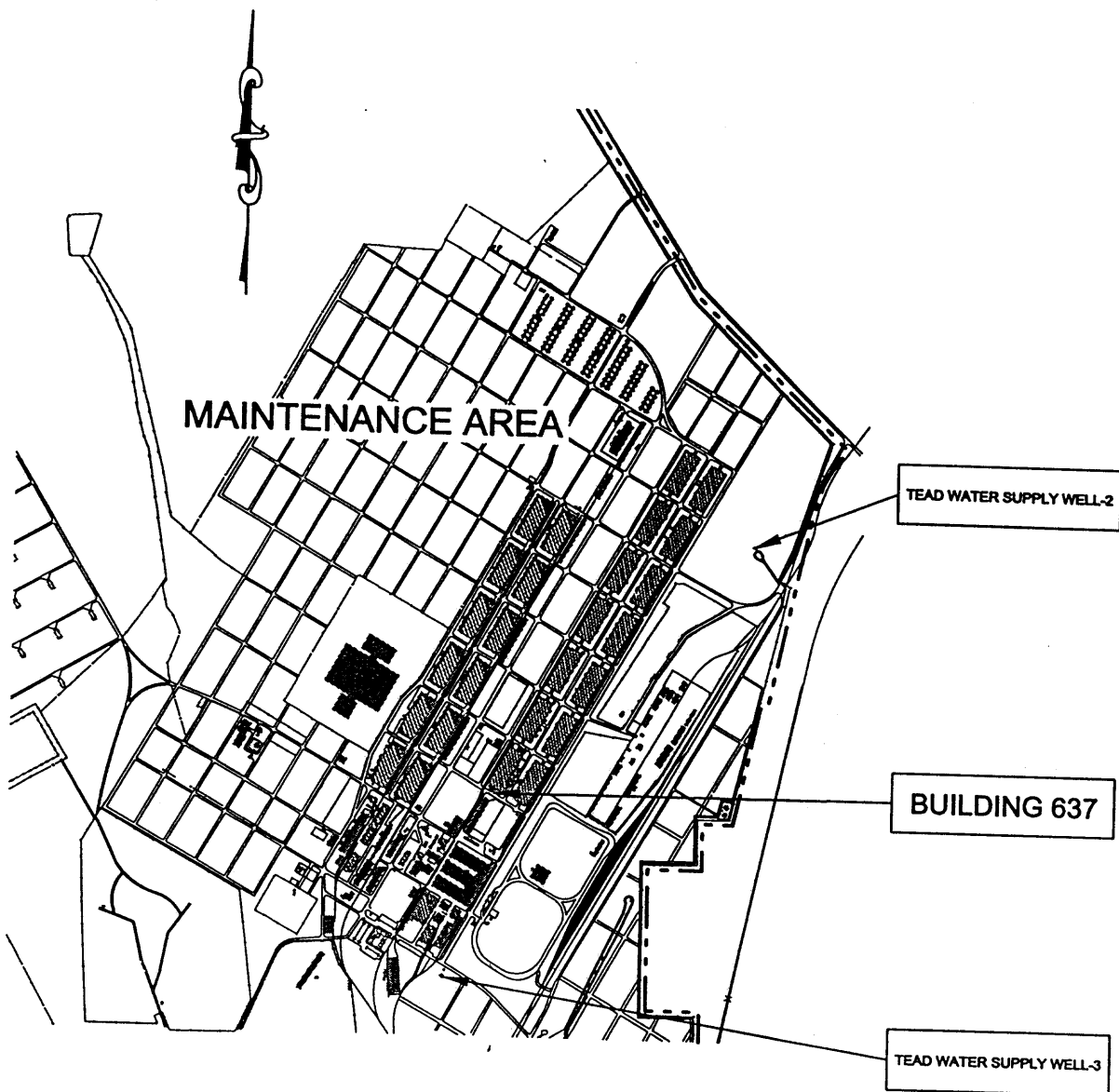
Date: 11-13-97
Filename: 1421A.m7

SITE LOCATION MAP

**TOOELE ARMY DEPOT
TOOELE, UTAH**

FIGURE

1



SCALE: 1 inch = 2000 ft.

KH KLEINFELDER

SITE LOCATION MAP
BUILDING 637 NORTH LUST SITE

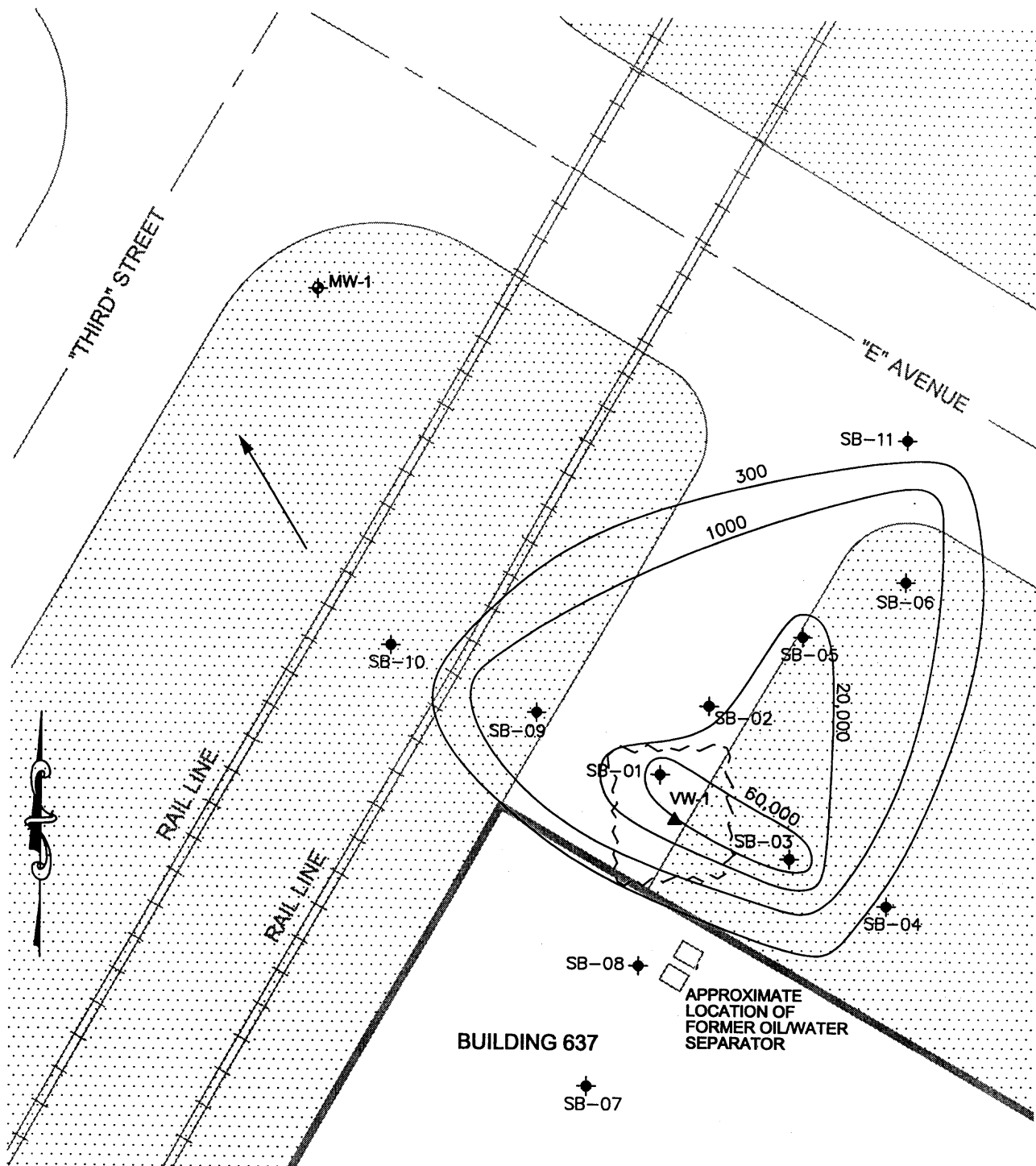
PLATE

Drawn By: R. PERSONIUS
Project No.: 23-900023-A12

Date: 11-13-97
Filename: 1421B

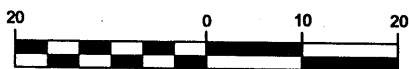
TOOELE ARMY DEPOT
TOOELE, UTAH

2



LEGEND

- ◆ MW-# MONITORING WELL
- ▲ VW-# VENT WELL
- ◆ SB-# SOIL BORING



SCALE: 1 inch = 20 ft.

- TRPH (mg/kg) ISOCONCENTRATION CONTOUR AT APPROXIMATELY 15 FT. BGS
- - - APPROXIMATE EXCAVATION BOUNDARY
- APPROXIMATE GROUNDWATER FLOW DIRECTION
- ▨ INDICATES UNCOVERED AREA

SOURCE: KLEINFELDER & JACOBS ENGINEERING, 1996



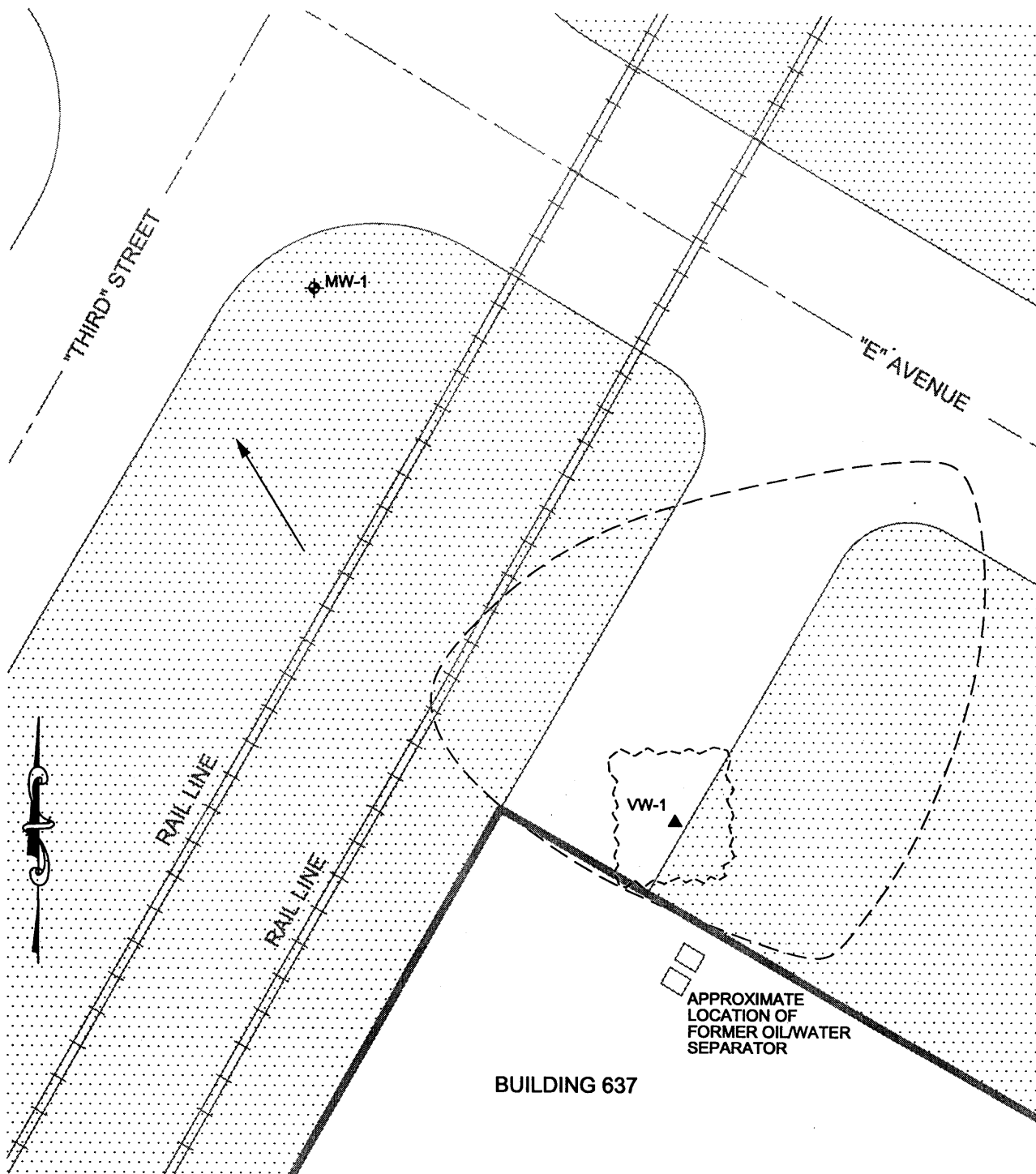
INITIAL INVESTIGATION SOIL BORING LOCATIONS
AND ESTIMATED TRPH CONCENTRATIONS
BUILDING 637 NORTH LUST SITE
TOOELE ARMY DEPOT
TOOELE, UTAH

PLATE

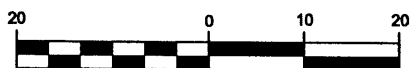
3

Drawn By: R. PERSONIUS
Project No.: 23-900023-A12

Date: 4-6-98
Filename: 1611a.fh7



◆ MW-# MONITORING WELL
 ▲ VW-# VENT WELL



SCALE: 1 inch = 20 ft.

LEGEND

--- APPROXIMATE EXTENT OF PETROLEUM IMPACTED SOIL.
 - - - APPROXIMATE EXCAVATION BOUNDARY
 → APPROXIMATE GROUNDWATER FLOW DIRECTION
 INDICATES UNCOVERED AREA



WELL LOCATIONS AND ESTIMATED EXTENT OF IMPACTED SOIL

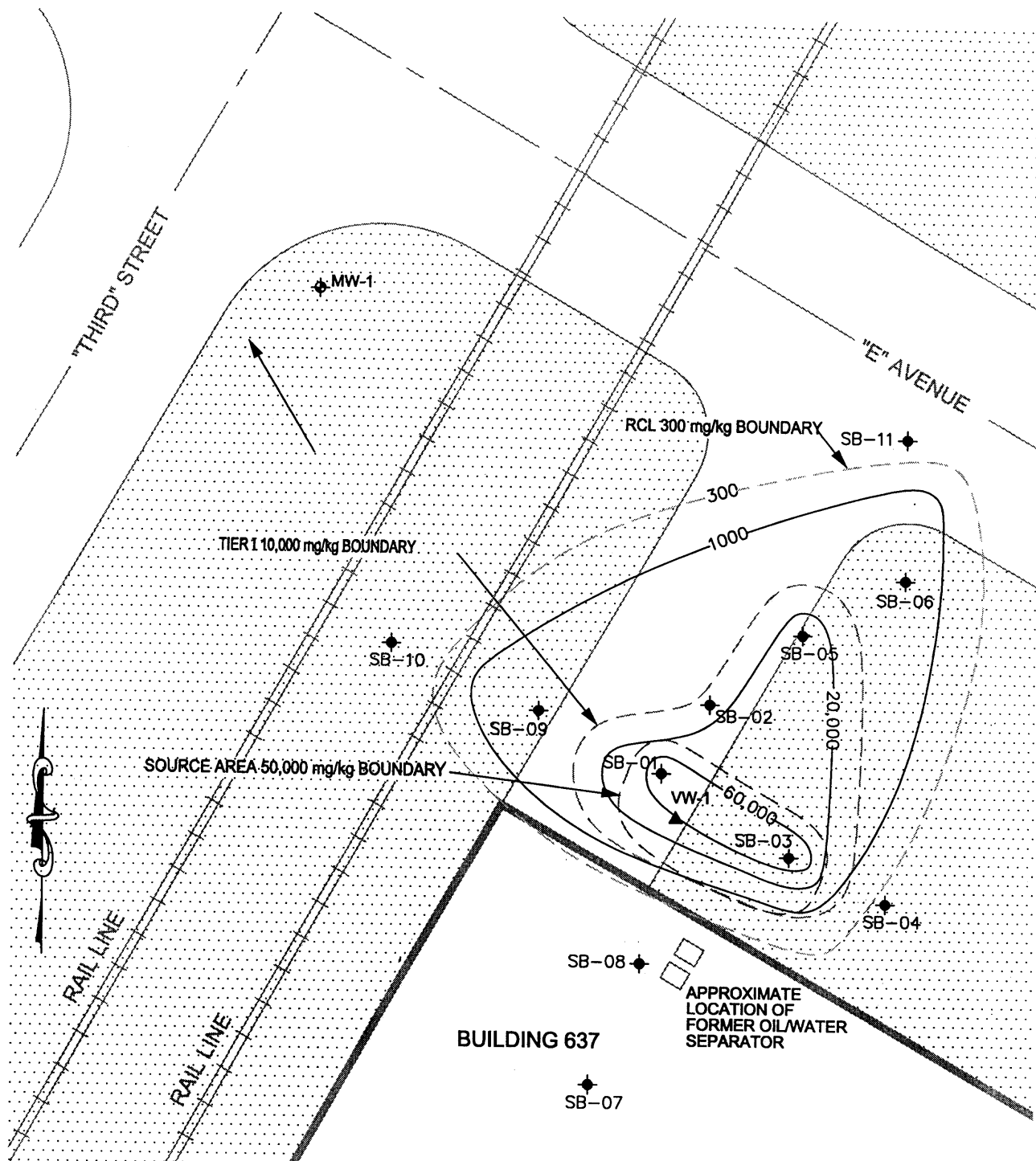
PLATE

Drawn By: R. PERSONIUS
 Project No.: 23-900023-A12

Date: 4-6-98
 Filename: 1611b.fh7

TOOELE ARMY DEPOT
 TOOELE, UTAH

4



KLEINFELDER

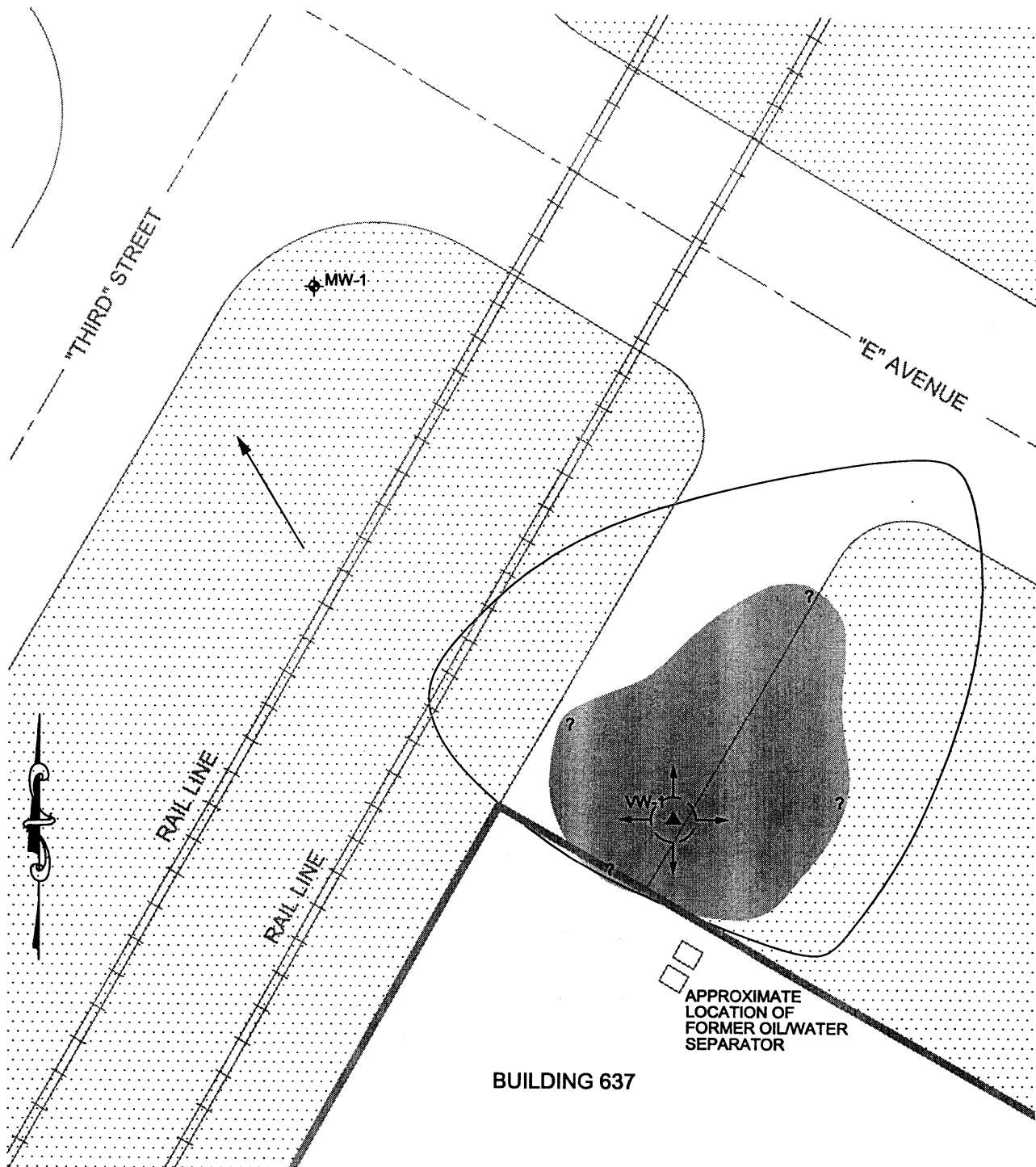
APPROXIMATE BOUNDARIES OF SHALLOW CONTAMINATION
637N CORRECTIVE ACTION PLAN
BUILDING 637 NORTH LUST SITE
TOOELE ARMY DEPOT
TOOELE, UTAH

PLATE

5

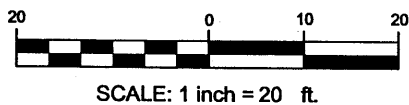
Drawn By: R. PERSONIUS
Project No.: 23-900023-A12

Date: 4-6-98
Filename: 1611c.fh7



LEGEND

⊕ MW-# MONITORING WELL
 ▲ VW-# VENT WELL



— APPROXIMATE EXTENT OF PETROLEUM IMPACTED SOIL (300 mg/kg)
 - - - INITIAL EXCAVATION TARGET
 → APPROXIMATE GROUNDWATER FLOW DIRECTION
 . . . INDICATES UNCOVERED AREA
 ——— ROUGH MAXIMUM EXTENT OF EXCAVATION

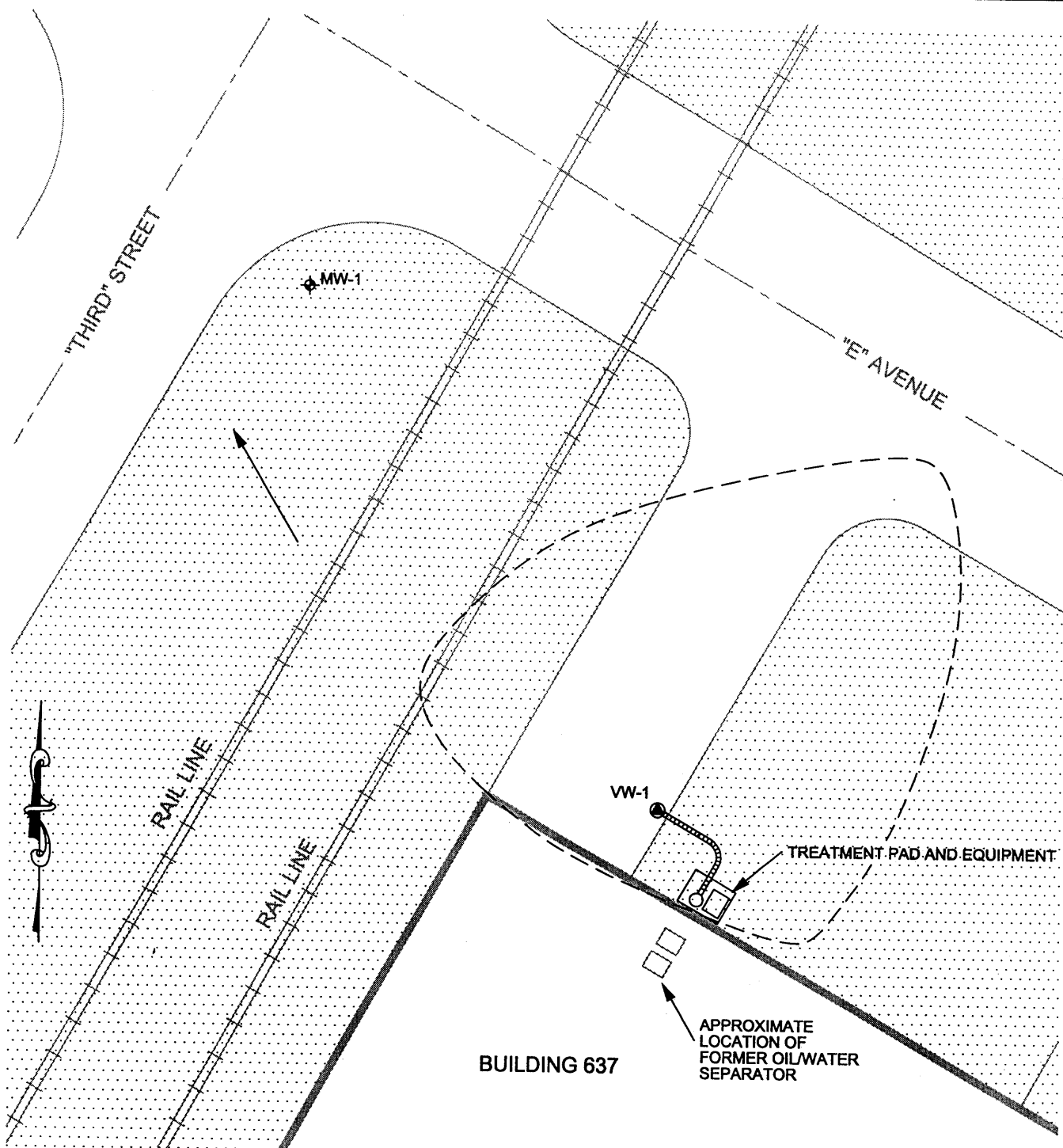


EXCAVATION STRATEGY
 637N CORRECTIVE ACTION PLAN
 BUILDING 637 NORTH LUST SITE
 TOOELE ARMY DEPOT
 TOOELE, UTAH

PLATE

6

Drawn By: R. PERSONIUS
 Project No.: 23-900023-A12
 Date: 4-6-98
 Filename: 1611d.dwg



LEGEND

- ◆ MW-# MONITORING WELL
- ▲ VW-# VENT WELL



SCALE: 1 inch = 20 ft.

- - - - - APPROXIMATE EXTENT OF PETROLEUM IMPACTED SOIL (300 mg/kg)
- APPROXIMATE GROUNDWATER FLOW DIRECTION
- INDICATES UNCOVERED AREA



KLEINFELDER

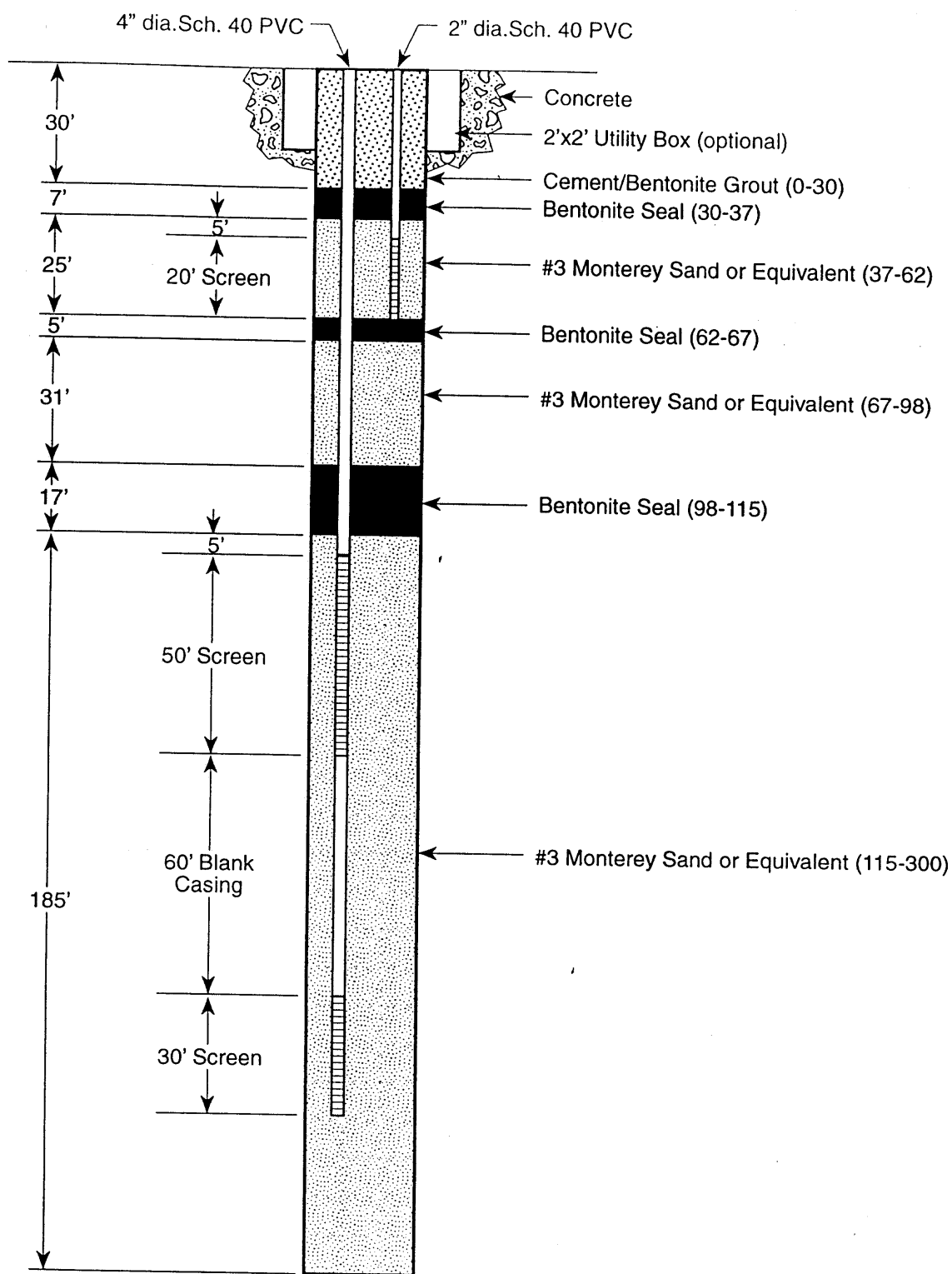
LAYOUT OF BIOVENTING SYSTEM
637N CORRECTIVE ACTION PLAN
BUILDING 637 NORTH LUST SITE
TOOELE ARMY DEPOT
TOOELE, UTAH

PLATE

7

Drawn By: R. PERSONIUS
Project No.: 23-900023-A12

Date: 4-6-98
Filename: 1611e.dwg



DUAL NEST INSTALLATION

NOT TO SCALE



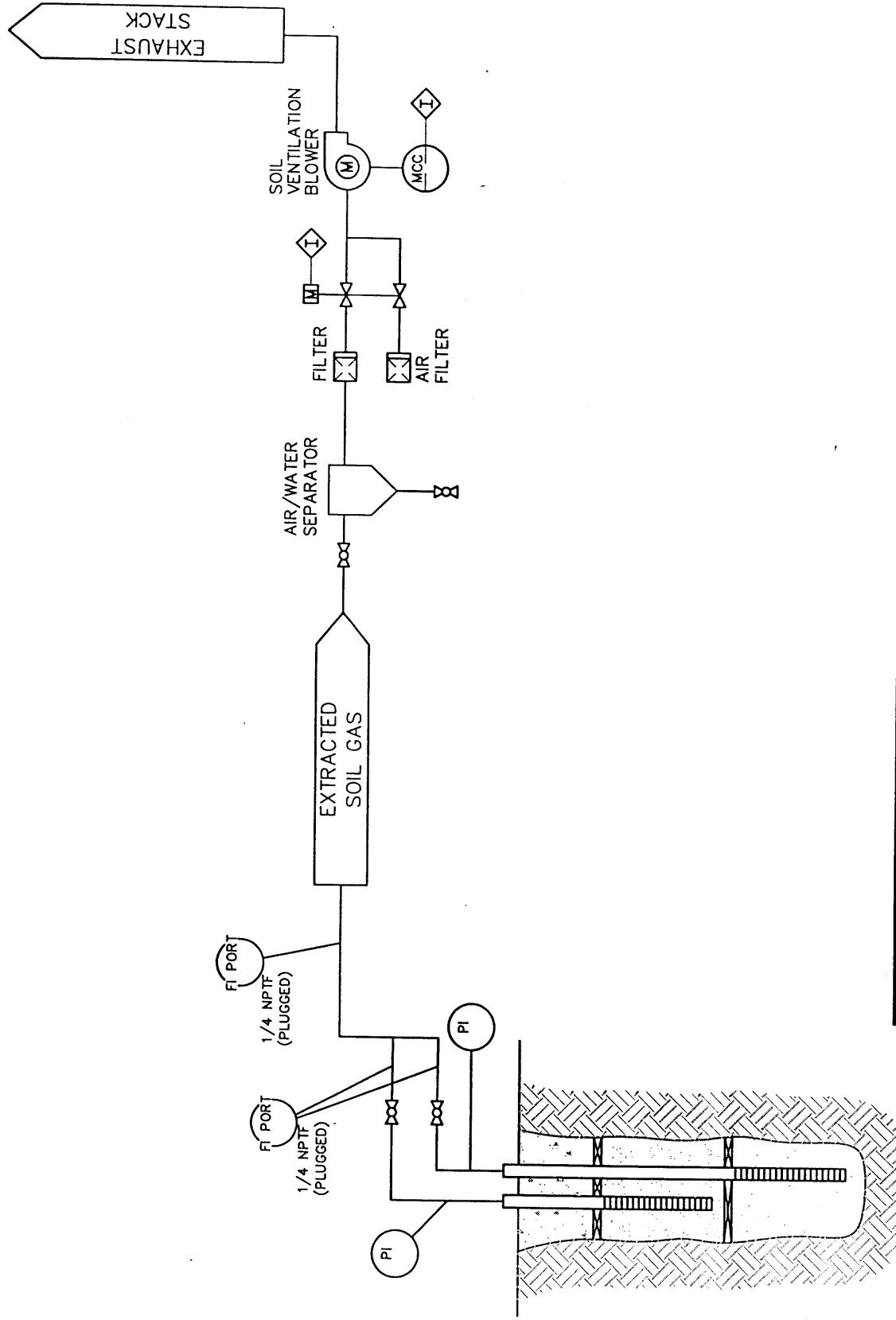
VENT WELL CONSTRUCTION DETAIL
 637N CORRECTIVE ACTION PLAN
 BUILDING 637 NORTH LUST SITE
 TOOEELE ARMY DEPOT
 TOOEELE, UTAH

PLATE

8

Drawn By: D. Shelhart
 Project No. 23-900023-A13

Date: 12/18/97
 Filename: 1424C.fh7



NESTED VENT WELL

KLEINFELDER		PROCESS & INSTRUMENTATION DIAGRAM - BIOVENTING PLATE 637N CORRECTIVE ACTION PLAN BUILDING 637 NORTH LUST SITE TOOEELE ARMY DEPOT TOOEELE, UTAH	9
Drawn By: R. PERSONIUS Project No.: 23-900023-A12	Date: 12-18-97 Filename: 1468E		

**CORRECTIVE ACTION PLAN
BUILDING 637 NORTH LUST SITE
APPENDIX B:
SUPPLEMENTAL SUBSURFACE
INVESTIGATION REPORT
TOOELE ARMY DEPOT, UTAH**

DERR/UST Facility I.D. #8000047
DERR Release Site EIPL

April 3, 1998

A report prepared for

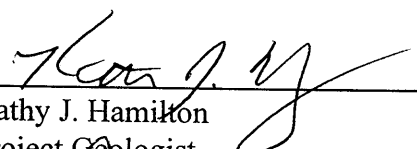
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1325 J Street
Sacramento, California 95814-2922

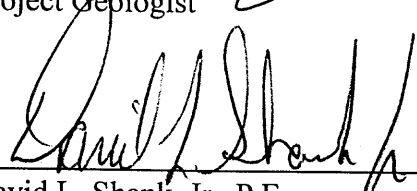
**CORRECTIVE ACTION PLAN
BUILDING 637 NORTH LUST SITE
APPENDIX B:
SUPPLEMENTAL SUBSURFACE INVESTIGATION REPORT
TOOELE ARMY DEPOT, UTAH**

DERR/UST Facility I.D. #8000047
DERR Release Site EIPL

Kleinfelder Job No.: 23-900023-A12

Prepared by:



Kathy J. Hamilton
Project Geologist

David L. Shank, Jr., P.E.
UST Consultant #CC0028

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April 3, 1998

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 - 2 Site Location Map - 637 North LUST Site
 - 3 Initial Investigation Soil Boring Locations and Estimated TRPH Concentrations
 - 4 Well Locations and Estimated Extent of Impacted Soil
- B Soil Boring Logs, Well Construction Schematics, Field Notes
- C Laboratory Analytical Reports
 - Chains of Custody
 - Cooler Receipt Forms
 - Sample Tracking Forms
- D Data Verification Summary Report
- E USACE Data Validation Report

1. EXECUTIVE SUMMARY

In April and May, 1997, Kleinfelder performed a supplemental site investigation (SI) at the former location of a waste oil underground storage tank (UST), near the northwest corner of Building 637 (637N) on the Tooele Army Depot. The initial SI, performed in 1995, detected petroleum hydrocarbon compounds, naphthalene, and benzo(a)pyrene in soils surrounding the former UST location. The site was designated Utah Department of Environmental Quality, Division of Environmental Response and Remediation (DERR) Release Site EIPL, LUST Identification #8000047.

The initial SI assessed the lateral extent of petroleum hydrocarbon compounds in soil. However, total recoverable petroleum hydrocarbons (TRPH) were detected in the UST excavation boring (SB-01) and in five of the other borings (SB-02, -03, -05, -06, and -09) at the greatest depths explored, 20 to 46.5 feet. Therefore, additional site investigation was necessary to assess the depth of contamination. The objectives of the supplemental SI were to assess the vertical extent of petroleum hydrocarbon compounds in soils, and to assess groundwater for the presence of petroleum hydrocarbon compounds.

The supplemental SI included drilling and sampling two soil borings. One was drilled within the former location of the waste oil UST excavation, terminated approximately 40 feet above the water table, and completed as a soil gas ventilation well. The other boring was drilled to approximately 25 feet below the water table and completed as a groundwater monitoring well. Groundwater was encountered at a depth of approximately 342.5 feet. Selected soil samples from both borings were analyzed for petroleum hydrocarbon compounds, volatile organic compounds (VOCs), and semi-volatile organic compounds.

Analyzed compounds were not detected in soil samples from the monitoring well boring. Soil samples from the UST excavation boring from depths as great as 115 feet contained petroleum hydrocarbon compounds at concentrations above laboratory reporting limits. The results of screening for evidence of volatile organic chemicals using a photoionization detector indicated petroleum hydrocarbon compounds may be present as deep as 215 feet. On the basis of these and previous results, Kleinfelder estimates the depth of contamination between 115 and 215 feet.

One VOC, 1,2-dichloroethane, was detected in a groundwater sample collected from the monitoring well.

Kleinfelder recommends corrective action for this site. Remediation by a combination of excavation, bioremediation, and capping may be suitable for site soils, and will be evaluated along with other selected technologies, in developing a corrective action plan. Additionally, we recommend assessing groundwater sitewide under a separate work scope.

2. INTRODUCTION

This supplemental Site Investigation (SI) addresses the leaking underground storage tank (LUST) formerly located near the northwest corner of Building 637 [LUST Identification #8000047; Utah Department of Environmental Quality (UDEQ), Division of Environmental Response and Remediation (DERR) Release Site EIPL]. This SI was performed to supplement information presented in the January 25, 1996 "Initial Site Characterization and Subsurface Investigation Report, Building 637 North LUST Site, Tooele Army Depot, North Area, Tooele, Utah" (Kleinfelder, 1996). The site investigations were performed in response to requirements of DERR, and in accordance with protocols established for leaking underground storage tanks (USTs).

This report was prepared on behalf of the Tooele Army Depot Directorate of Industrial Risk Management, Environmental Management Division. The supplemental SI work scope was described in the U.S. Army Corps of Engineers Work Scope dated September 18, 1996. The work was authorized by SDSTE-IRE-EP letter dated December 19, 1994, and performed under A-E Contract No. DACW05-95-D-0022.

The initial site characterization assessed the lateral extent of petroleum hydrocarbons in soils surrounding the former location of UST. Contamination was found to extend to the greatest depth explored. The objectives of this supplemental SI were to further assess the depth of petroleum hydrocarbons in the soil, and to assess groundwater for the presence of hydrocarbon compounds.

2.1 SITE DESCRIPTION

The Building 637 North (637N) site is located on the Tooele Army Depot (TEAD), in eastern Tooele County, approximately 35 miles southwest of Salt Lake City, Utah (Plate 1, Appendix A). The site is the former location of a waste oil UST located near the northwest corner of Building 637 in a developed industrial section of TEAD known as the "Maintenance and Supply Area."

2.2 BACKGROUND INFORMATION

2.2.1 Site Use History

The Maintenance and Supply Area, which includes 637N, is comprised of paved streets, large warehouses and vehicle maintenance buildings, and underground and above-ground utilities. The ground surface includes both gravel- and asphalt-covered areas. Building 637 is an approximately 90,000-square foot frame building formerly used for vehicle engine and transmission repair, rebuilding, and testing. Two groups of engine test cells are present along the east and south walls of the building. USTs that supplied gasoline and diesel fuel to the engine test cells, and a waste oil UST were located near Building 637. The latter UST received waste oil from an oil-water separator inside Building 637. In 1994, the USTs were removed by England Construction (England).

2.2.2 Site Investigation History and Findings

When England removed the waste oil UST, its condition was reportedly good, but the connection between the UST and piping leading to the oil-water separator appeared cracked and deteriorated. England collected two soil samples from the excavation bottom. These samples were analyzed for hydrocarbon compounds as required by the State of Utah. Later, Kleinfelder collected two additional soil samples, one each from the excavation sidewall and bottom. These samples were analyzed for semivolatile organic compounds (SVOCs).

Oil and grease were detected in the soil samples England collected. Other analyzed compounds were not detected above laboratory reporting limits, or were detected at concentrations below the laboratory quantification limits. Long-chain (C20 to C30) hydrocarbons were detected in the soil samples Kleinfelder collected.

In October and November 1995, Kleinfelder and Jacobs Engineering Group investigated soils at the 637N site. The investigation included drilling and sampling 11 soil borings to depths of 20 to 46.5 feet, chemically analyzing 25 soil samples, screening for volatile organic vapors, and assessing soil permeability (Kleinfelder, Inc. and Jacobs Engineering, 1996). One of the borings was drilled through the UST excavation and the others were drilled within 48 feet of the excavation. Total recoverable petroleum hydrocarbons (TRPH), benzene, naphthalene, and benzo(a)pyrene were detected in the soil samples at concentrations exceeding State of Utah recommended cleanup levels.

The results of the 1995 investigation indicated the lateral extent of petroleum-impacted soil as shown on Plate 2 (Appendix A). The lateral extent of impacted soil is estimated to be 65 feet by 65 feet (4,225 square feet). Petroleum hydrocarbons were detected in soil samples collected from the greatest depths explored in 6 of the soil borings.

To further assess the depth of petroleum hydrocarbon in the soil, and to assess groundwater for the presence of hydrocarbon compounds, Kleinfelder performed a supplemental SI, which included the following: drilling, sampling, and lithologically logging two soil borings, one of which was completed as a shallow soil gas ventilation well; and one was completed as a monitoring well; sampling groundwater from the monitoring well; and analyzing soil and groundwater samples for petroleum hydrocarbon compounds, volatile organic compounds (VOCs), and SVOCs. Kleinfelder's field investigation procedures and results are described in the following chapters.

3. SUPPLEMENTAL FIELD AND LABORATORY INVESTIGATION

On April 4 through 8, and May 12, Kleinfelder performed a supplemental SI at the 637N LUST site to further assess the depth of petroleum hydrocarbons in soils at the former waste oil UST location. Following are summaries of the drilling, sampling, and well construction methods. Kleinfelder's field methods, including drilling and soil sampling techniques, field screening procedures, and well construction are described in greater detail in the "Monitoring Well C-16 Completion Report" (Kleinfelder, 1997). Procedures for drilling borings, collecting soil samples; and constructing, developing, and sampling monitoring wells are described in the "Project Workplans, Additional Subsurface Characterization, Building 637-N, 637-SW, 637-SE and 691 LUST Sites" (Kleinfelder and U.S. Army Corps of Engineers, 1996).

3.1 DRILLING AND SOIL SAMPLING

Kleinfelder's subcontractor, Layne Christensen Company (Layne), drilled two soil borings; one (VW-1) was drilled to a depth of 300 feet within the former waste oil UST excavation. Two soil gas ventilation wells were installed in the boring, one to a depth of 60 feet and one to a depth of 260 feet. The other boring (C-16) was drilled to a depth of 365 feet and completed to a depth of approximately 360 feet as a groundwater monitoring well. The C-16 boring was drilled in a location where soils were not suspected to be contaminated. Soil cuttings were containerized for future disposal pending receipt of soil sample analytical results. Groundwater was encountered at a depth of approximately 342.5 feet.

The boring/well locations are shown on Plate 2. Boring logs and well construction schematics are in Appendix B.

The C-16 and VW-1 soil borings were drilled using the reverse-circulation percussion drilling method. Kleinfelder collected grab samples of soil from both borings at approximately 5-foot intervals. Kleinfelder's geologist examined the samples for preparing lithologic logs (Appendix B). The soil samples were screened for volatile organic vapors using a photoionization detector (PID). In VW-1 soil samples were screened for polyaromatic hydrocarbons (PAHs) at regular intervals by a chemist with Mountain States Analytical Laboratory using the DTech immunoassay detection kit. PID screening results were recorded on the lithologic logs and DTech results were recorded in the drilling logs (Appendix B). Selected soil samples were held

in an ice-cooled chest for overnight delivery to the analytical laboratory.

Generally, soil samples selected for chemical analyses were those with the greatest screening results and those from the bottom of the unsaturated zone. Additionally, one soil sample from the saturated zone in C-16 was analyzed for disposal profiling. The soil samples were maintained under chain of custody. Copies of the chains of custody and cooler receipt forms are in Appendix C.

3.2 GROUNDWATER MONITORING WELL CONSTRUCTION, DEVELOPMENT AND SAMPLING

Kleinfelder's subcontractor, Professional Services Group (PSG) developed and sampled the new monitoring well, C-16. The well was developed by swabbing and bailing, followed by pumping with an electric submersible pump. Development was performed more than 72 hours after construction was completed. Well development purge water was containerized for later disposal, pending receipt of groundwater sample analytical results.

PSG collected four groundwater samples from C-16. The well was purged using an electric submersible pump, and water samples were collected using a disposable Teflon bailer. Groundwater samples were collected in containers provided by the analytical laboratory. The sample containers were placed into an ice-cooled chest for overnight shipping to the analytical laboratory. Samples were maintained under chain of custody. Chains of custody, cooler receipt forms, and sample tracking forms are in Appendix C.

3.3 LABORATORY ANALYSES

Kleinfelder submitted 5 soil samples from the VW-1 boring (from depths of 38, 45, 115, 215, and 300 feet) and 3 soil samples from the C-16 boring (from depths of 330, 345, and 350 feet) for chemical analyses. Each of these samples was collected from the unsaturated zone, except the two deeper ones from the C-16 boring (345 and 350 feet).

Each of the VW-1 boring samples was analyzed VOCs, SVOCs, and purgeable and extractable petroleum hydrocarbon. One of the VW-1 boring soil samples was also analyzed for iron, total Kjeldahl nitrogen (TKN), pH, phosphorus, and nitrate as nitrogen. The C-16 boring samples were analyzed for VOCs, SVOCs, purgeable and extractable petroleum hydrocarbons, and percent moisture. The two deeper samples collected from C-16 from the saturated zone were

chemically analyzed for disposal profiling.

Four groundwater samples were collected from the new monitoring well, C-16. One sample each was analyzed for VOCs, SVOCs, purgeable TPH, and major ions.

Mountain States Analytical analyzed the soil and groundwater samples for VOCs. Curtis and Tompkins, Ltd. performed the remaining analyses.

4. CONTAMINATION ASSESSMENT

4.1 PID AND DTECH SCREENING RESULTS

PID screening results are noted on the soil boring lithologic logs (Appendix B). Volatile organic vapors were not detected in the C-16 boring soil samples. PID screening results for the VW-1 boring ranged from less than 1.9 parts per million by volume (ppmv) to 173 ppmv. Screening values for soil samples from depths of 46 feet and 71 feet exceeded 100 ppmv, and values for samples from depths of 206 feet and greater were less than 1.9 ppmv. Screening values for soil samples from depths of 172 to 206 feet ranged from 3.9 to 5.9 ppmv. Kleinfelder does not consider screening results less than 100 ppmv significant because moisture, ambient temperature, and naturally occurring material in the soil influence the readings.

DTech screening results in VW-1 are summarized in the table below:

Depth below grade in boring VW-1	DTech Results for PAHs (ppm)
85 feet	> 25
92 feet	> 25
115 feet	> 25
158 feet	10 to 25
200 feet	< 1
230 feet	1 to 5
250 feet	< 1
280 feet	< 1
300 feet	< 1

4.2 SOIL SAMPLE ANALYTICAL RESULTS

Purgeable and extractable petroleum hydrocarbons and VOCs were detected in the VW-1 soil sample from 115 feet (PID screening value, 13.4 ppmv) (Table 1). Acetone was detected in two of the VW-1 soil samples at concentrations near the laboratory reporting limits of 10 and 11 micrograms per kilogram. This compound is a common laboratory contaminant, and in Kleinfelder's opinion, does not represent a soil contaminant. Extractable petroleum

hydrocarbons, one SVOC, and one VOC (acetone) were detected in the soil sample from 215 feet (PID screening value, less than 1.9 ppmv). The TPH concentration detected in this sample is low (88 milligrams per kilogram as diesel) (Table 1). With the exception of acetone, analyzed compounds were not detected in the soil sample from 300 feet (PID screening value, less than 1.9 ppmv).

With the exception of acetone, analyzed compounds were not detected in the soil samples collected from C-16/MW-1 (Table 1).

4.3 GROUNDWATER SAMPLE ANALYTICAL RESULTS

Groundwater sample analytical results are summarized on Table 2. One VOC, 1,2-dichloroethane, was detected in a groundwater sample. The detected concentration, 15 micrograms per liter ($\mu\text{g/l}$), exceeds the U.S. Environmental Protection Agency (E.P.A.) drinking water standards maximum contaminant level (MCL) of 5 $\mu\text{g/l}$.

4.4 DATA VERIFICATION

The analytical data were verified by Kleinfelder and validated by the USACE. Kleinfelder's "Data Verification Summary Report" is in Appendix D. Kleinfelder followed the procedures presented in the approved project Quality Assurance Project Plan (QAPP) to verify the quality and usability of the data obtained during this supplemental SI. Sample results were qualified using the flagging conventions of the USACE and the U.S. E.P.A.

Except as noted in the "Data Verification Summary Report", sample storage, preparation, analysis, reporting and quality control (QC) parameters were performed in accordance with the project specific quality control acceptance criteria and applicable analytical methodologies.

The analytical laboratories demonstrated that the target analytes were accurately identified and quantified. A small number of sample results were qualified due to minor inconsistencies with the project QAPP with respect to QC requirements and non-compliance. The required detection limits were met according to the requirements listed in the QAPP, with few exceptions due to high concentration of target compounds or matrix interference. The overall quality of the laboratory work is acceptable. In Kleinfelder's opinion, the analytical results are acceptable and useable with the noted qualifications.

5. CONCLUSIONS AND RECOMMENDATIONS

On the basis of the initial and supplemental SI results, the lateral extent of petroleum hydrocarbons in soil is approximately 65 feet by 65 feet (Figure 4). Petroleum hydrocarbons were detected in soil samples from as deep as 215 feet in the VW-1 boring, located within the former gasoline UST excavation (Plate 2). PID screening results are predictably low, considering the petroleum hydrocarbons detected in site soils are primarily of the longer-chained, non-volatile type. Generally, screening results did not exceed 100 ppmv (two exceptions were results for samples from depths of 46 and 71 feet). VW-1 soil samples collected from depths of 300, 345, and 350 feet did not contain petroleum hydrocarbons at concentrations exceeding laboratory reporting limits. On the basis of these results, Kleinfelder estimates the depth of impacted soil at 215 feet or less.

Kleinfelder recommends corrective action for this site because soil petroleum hydrocarbon concentrations in some areas exceed the DERR Tier I screening levels and the State of Utah Recommended Cleanup Levels. Excavation in combination with an in-situ soil treatment technology and capping would likely be a suitable remediation approach for this site, and will be evaluated along with selected other technologies in developing a corrective action plan.

Petroleum hydrocarbon compounds were not detected in groundwater, but 1,1-DCA was detected at a concentration exceeding the E.P.A. MCL. Groundwater contaminant plumes have been detected at other locations at TEAD. Therefore, Kleinfelder recommends addressing groundwater on a site-wide basis.

6. REFERENCES

Kleinfelder, Inc. and Jacobs Engineering Group, 1996, "Initial Site Characterization and Subsurface Investigation Report, Building 637 North LUST Site, Tooele Army Depot North Area, Tooele, Utah, DERR/UST Facility I.D. #8000047, DERR Release Site EIPL"; January 25, 1996.

Kleinfelder, Inc. and U.S. Army Corps of Engineers, 1996, "Project Workplans, Additional Subsurface Characterization, Building 637-N, 637-SW, 637-SE and 691 LUST Sites"; December 12, 1996. (*includes: Workplan Summary, Field Sampling Plan, Quality Assurance Project Plan, and Site-Specific Health and Safety Plan*)

Kleinfelder, Inc., 1997, "Monitoring Well C-16 Completion Report, Tooele Army Depot (TEAD), Tooele, Utah."

State of Utah, Department of Environmental Quality, Division of Environmental Response and Remediation, 1996, "Leaking Underground Storage Tank (LUST) Corrective Action Plan Report Guide", August 1996.

Table 1
Soil Sample Analytical Results
Building 637N - LUST Site
Tooele Army Depot

Sample Location	Depth (ft.)	Sample ID	Sample Date	Analysis Date	Method	Constituent Name	Result	Reporting Limit	Units	PID (ppmv)
VW-1	38	U3SP-0404-01	4/4/97	4/18/97	EPA 8015M/LUFT	Diesel C12-C22	5700	120	mg/Kg	59
VW-1	38	U3SP-0404-01	4/4/97	4/18/97	EPA 8015M/LUFT	Other components below reporting limits				59
VW-1	38	U3SP-0404-01	4/4/97	4/16/97	EPA 8015M/5030	Gasoline C4-C12	180	60	mg/Kg	59
VW-1	38	U3SP-0404-01	4/4/97	4/16/97	EPA 8015M/5030	Other components below reporting limits				59
VW-1	38	U3SP-0404-01	4/4/97	4/17/97	EPA 8260	Total Xylenes	0.82	0.15	mg/Kg	59
VW-1	38	U3SP-0404-01	4/4/97	4/17/97	EPA 8260	Ethylbenzene	0.47	0.3	mg/Kg	59
VW-1	38	U3SP-0404-01	4/4/97	4/17/97	EPA 8260	Naphthalene	3.4	2	mg/Kg	59
VW-1	38	U3SP-0404-01	4/4/97	4/17/97	EPA 8260	Other analytes below reporting limits				59
VW-1	38	U3SP-0404-01	4/4/97	4/25/97	EPA 8270A	Benzo(a)pyrene	4.6	4	mg/Kg	59
VW-1	38	U3SP-0404-01	4/4/97	4/25/97	EPA 8270A	Chrysene	8.1	4	mg/Kg	59
VW-1	38	U3SP-0404-01	4/4/97	4/25/97	EPA 8270A	Pyrene	6.8	4	mg/Kg	59
VW-1	38	U3SP-0404-01	4/4/97	4/25/97	EPA 8270A	Phenanthrene	10	4	mg/Kg	59
VW-1	38	U3SP-0404-01	4/4/97	4/25/97	EPA 8270A	2-Methylnaphthalene	7.4	4	mg/Kg	59
VW-1	38	U3SP-0404-01	4/4/97	4/25/97	EPA 8270A	Other analytes below reporting limits				59
VW-1	45	U3SP-0404-02	4/4/97	4/17/97	EPA 300.0	Analytes below reporting limits				101
VW-1	45	U3SP-0404-02	4/4/97	4/23/97	EPA 351.4	Total Kjeldahl Nitrogen	160	130	mg/Kg	101
VW-1	45	U3SP-0404-02	4/4/97	4/22/97	EPA 365.2	Analytes below reporting limits				101
VW-1	45	U3SP-0404-02	4/4/97	4/16/97	EPA 6010A	Iron	6100	6.5	mg/Kg	101
VW-1	45	U3SP-0404-02	4/4/97	4/16/97	EPA 6010A	Other analytes below reporting limits				101
VW-1	45	U3SP-0404-02	4/4/97	4/18/97	EPA 8015M/LUFT	Diesel C12-C22	7700	650	mg/Kg	101
VW-1	45	U3SP-0404-02	4/4/97	4/18/97	EPA 8015M/LUFT	Other components below reporting limits				101
VW-1	45	U3SP-0404-02	4/4/97	4/15/97	EPA 8015M/5030	Gasoline C4-C12	520	130	mg/Kg	101
VW-1	45	U3SP-0404-02	4/4/97	4/15/97	EPA 8015M/5030	Other components below reporting limits				101
VW-1	45	U3SP-0404-02	4/4/97	4/17/97	EPA 8260	Total Xylenes	2.3	0.22	mg/Kg	101
VW-1	45	U3SP-0404-02	4/4/97	4/17/97	EPA 8260	Toluene	0.5	0.43	mg/Kg	101

Notes:

PID = Photoionization detector (headspace reading); NM = not measured, ND = not detected.

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Table 1
Soil Sample Analytical Results
Building 637N - LUST Site
Tooele Army Depot

Sample Location	Depth (ft.)	Sample ID	Sample Date	Analysis Date	Method	Constituent Name	Result	Reporting Limit	Units	PID (ppmv)
VW-1	45	U3SP-0404-02	4/4/97	4/17/97	EPA 8260	Ethylbenzene	0.76	0.43	mg/Kg	101
VW-1	45	U3SP-0404-02	4/4/97	4/17/97	EPA 8260	Naphthalene	4.9	2.2	mg/Kg	101
VW-1	45	U3SP-0404-02	4/4/97	4/17/97	EPA 8260	Other analytes below reporting limits				101
VW-1	45	U3SP-0404-02	4/4/97	4/25/97	EPA 8270A	2-Methylnaphthalene	5.5	4.3	mg/Kg	101
VW-1	45	U3SP-0404-02	4/4/97	4/25/97	EPA 8270A	Phenanthrene	4.7	4.3	mg/Kg	101
VW-1	45	U3SP-0404-02	4/4/97	4/25/97	EPA 8270A	Other analytes below reporting limits				101
VW-1	115	U3SP-0405-02	4/5/97	4/18/97	EPA 8015M/LUFT	Diesel C12-C22	9200	610	mg/Kg	13.4
VW-1	115	U3SP-0405-02	4/5/97	4/18/97	EPA 8015M/LUFT	Other components below reporting limits				13.4
VW-1	115	U3SP-0405-02	4/5/97	4/16/97	EPA 8015M/5030	Gasoline C4-C12	210	61	mg/Kg	13.4
VW-1	115	U3SP-0405-02	4/5/97	4/16/97	EPA 8015M/5030	Other components below reporting limits				13.4
VW-1	115	U3SP-0405-02	4/5/97	4/17/97	EPA 8260	Total Xylenes	0.49	0.15	mg/Kg	13.4
VW-1	115	U3SP-0405-02	4/5/97	4/17/97	EPA 8260	Naphthalene	6	1.5	mg/Kg	13.4
VW-1	115	U3SP-0405-02	4/5/97	4/17/97	EPA 8260	Other analytes below reporting limits				13.4
VW-1	115	U3SP-0405-02	4/5/97	4/23/97	EPA 8270A	Analytes below reporting limits				13.4
VW-1	215	U3SP-0407-02	4/7/97	4/18/97	EPA 8015M/LUFT	Diesel C12-C22	88	5.2	mg/Kg	<1.9
VW-1	215	U3SP-0407-02	4/7/97	4/18/97	EPA 8015M/LUFT	Other components below reporting limits				<1.9
VW-1	215	U3SP-0407-02	4/7/97	4/15/97	EPA 8015M/5030	Components below reporting limits				<1.9
VW-1	215	U3SP-0407-02	4/7/97	4/12/97	EPA 8260	Acetone	0.012	0.01	mg/Kg	<1.9
VW-1	215	U3SP-0407-02	4/7/97	4/12/97	EPA 8260	Other analytes below reporting limits				<1.9
VW-1	215	U3SP-0407-02	4/7/97	4/17/97	EPA 8270A	Bis(2-ethylhexyl)phthalate	3	0.34	mg/Kg	<1.9
VW-1	215	U3SP-0407-02	4/7/97	4/17/97	EPA 8270A	Other analytes below reporting limits				<1.9
VW-1	300	U3SP-0408-03	4/8/97	4/18/97	EPA 8015M/LUFT	Components below reporting limits				NM
VW-1	300	U3SP-0408-03	4/8/97	4/15/97	EPA 8015M/5030	Components below reporting limits				NM
VW-1	300	U3SP-0408-03	4/8/97	4/12/97	EPA 8260	Acetone	0.031	0.011	mg/Kg	NM

Notes:

PID = Photoionization detector (headspace reading); NM = not measured, ND = not detected.

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Table 1
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Building 637N - LUST Site
Tooele Army Depot

Sample Location	Depth (ft.)	Sample ID	Sample Date	Analysis Date	Method	Constituent Name	Result	Reporting Limit	Units	PID (ppmv)
VW-1	300	U3SP-0408-03	4/8/97	4/12/97	EPA 8260	Other analytes below reporting limits				NM
VW-1	300	U3SP-0408-03	4/8/97	4/17/97	EPA 8270A	Analytes below reporting limits				NM
C-17	330	U3SP041701	4/17/97	4/30/97	EPA 8015M/LUFT	Components below reporting limits				ND
C-17	330	U3SP041701	4/17/97	4/29/97	EPA 8015M/5030	Components below reporting limits				ND
C-17	330	U3SP041701	4/17/97	4/25/97	EPA 8260	Acetone	0.024	0.01	mg/Kg	ND
C-17	330	U3SP041701	4/17/97	4/25/97	EPA 8260	Other analytes below reporting limits				ND
C-17	330	U3SP041701	4/17/97	5/6/97	EPA 8270A	Analytes below reporting limits				ND
C-17	345	U3SP041801	4/18/97	4/30/97	EPA 8015M/LUFT	Components below reporting limits				ND
C-17	345	U3SP041801	4/18/97	4/29/97	EPA 8015M/5030	Components below reporting limits				ND
C-17	345	U3SP041801	4/18/97	4/25/97	EPA 8260	Analytes below reporting limits				ND
C-17	345	U3SP041801	4/18/97	5/5/97	EPA 8270A	Analytes below reporting limits				ND
C-17	350	U3SP041802	4/18/97	4/30/97	EPA 8015M/LUFT	Components below reporting limits				ND
C-17	350	U3SP041802	4/18/97	4/29/97	EPA 8015M/5030	Components below reporting limits				ND
C-17	350	U3SP041802	4/18/97	4/25/97	EPA 8260	Acetone	0.013	0.011	mg/Kg	ND
C-17	350	U3SP041802	4/18/97	4/25/97	EPA 8260	Other analytes below reporting limits				ND
C-17	350	U3SP041802	4/18/97	5/5/97	EPA 8270A	Analytes below reporting limits				ND

Notes:

PID = Photoionization detector (headspace reading); NM = not measured, ND = not detected.

23-900023-A13/2317R766

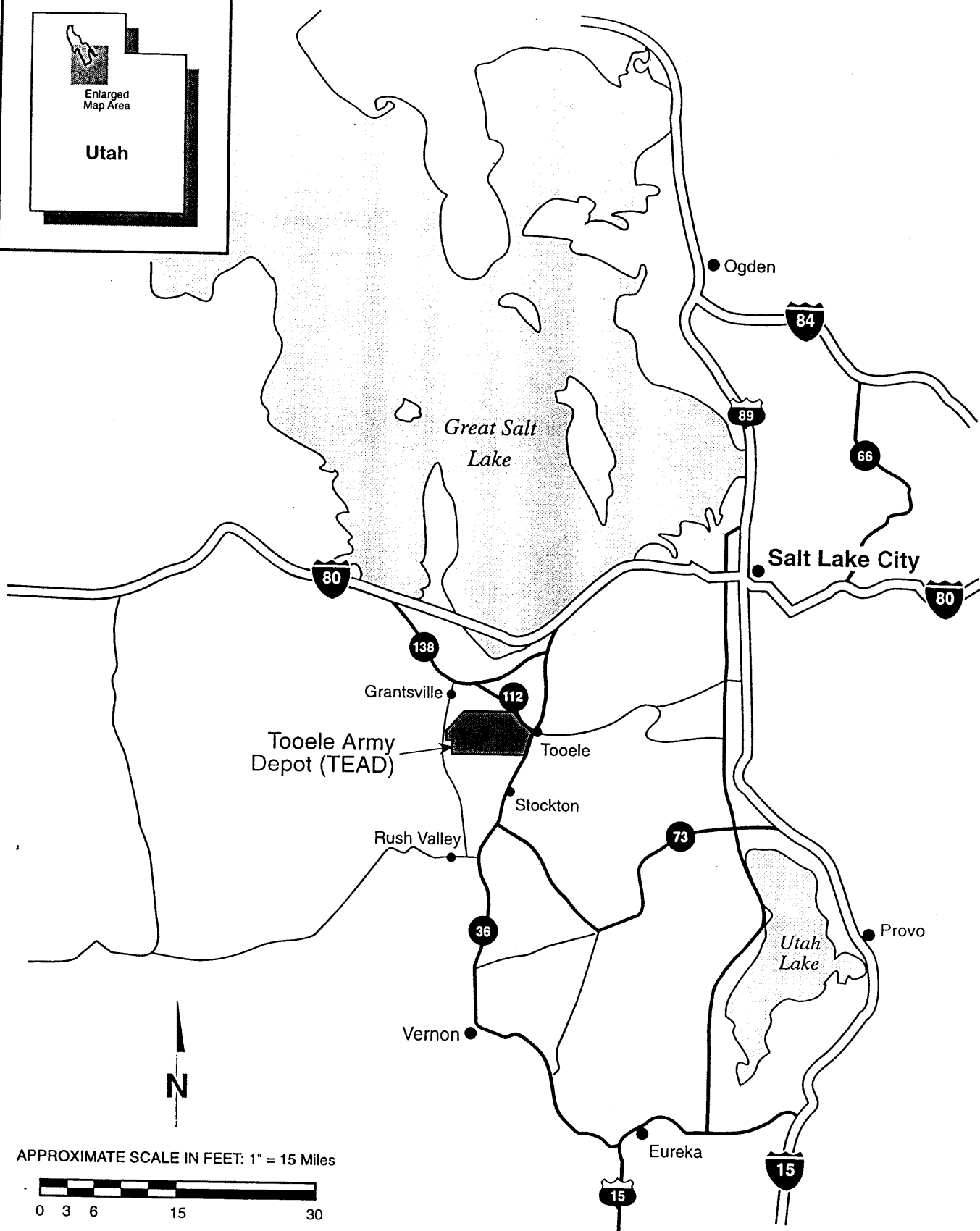
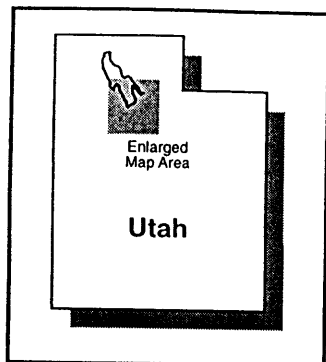
Table 2
Groundwater Sample Analytical Results
Building 637N LUST Site
Tooele Army Depot

Sample Location	Sample Type	Sample ID	Sample Date	Analysis Date	Method	Constituent Name	Result	Reporting Limit	Units
C-16	Groundwater	U3WP0512-01	5/12/97	5/31/97	EPA 8015M/5030	Components below reporting limits			
C-16	Groundwater	U3WP0512-01	5/12/97	5/22/97	EPA 8260	1,2-Dichloroethane	15	5	ug/L
C-16	Groundwater	U3WP0512-01	5/12/97	5/22/97	EPA 8260	Other analytes below reporting limits			
C-16	Groundwater	U3WP0512-02	5/12/97	5/27/97	EPA 8270A	Analytes below reporting limits			
C-16	Groundwater	U3WP0512-03	5/12/97	5/21/97	EPA 8015M/3520	Components below reporting limits			
C-16	Groundwater	U3WP0512-04	5/12/97	5/21/97	EPA 300.0	Chloride	380,000	100	ug/L
C-16	Groundwater	U3WP0512-04	5/12/97	5/21/97	EPA 300.0	Sulfate	120,000	100	ug/L
C-16	Groundwater	U3WP0512-04	5/12/97	5/23/97	EPA 310.1	Total Alkalinity	270,000	100,000	ug/L
C-16	Groundwater	U3WP0512-04	5/12/97	5/27/97	EPA 6010A	Magnesium	57,000	500	ug/L
C-16	Groundwater	U3WP0512-04	5/12/97	5/27/97	EPA 6010A	Potassium	4,100	500	ug/L
C-16	Groundwater	U3WP0512-04	5/12/97	5/27/97	EPA 6010A	Sodium	160,000	500	ug/L
C-16	Groundwater	U3WP0512-04	5/12/97	5/27/97	EPA 6010A	Calcium	130,000	500	ug/L
C-16	Groundwater	U3WP0512-04	5/12/97	5/27/97	EPA 6010A	Other analytes below reporting limits			



APPENDIX A

PLATES



Drawn By: M. Bussanich
Project No. 23-900023-A12

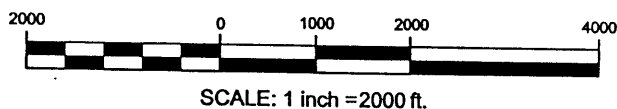
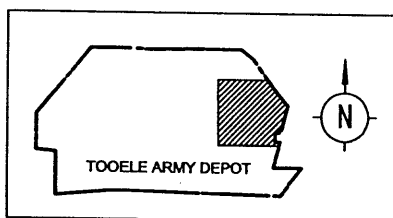
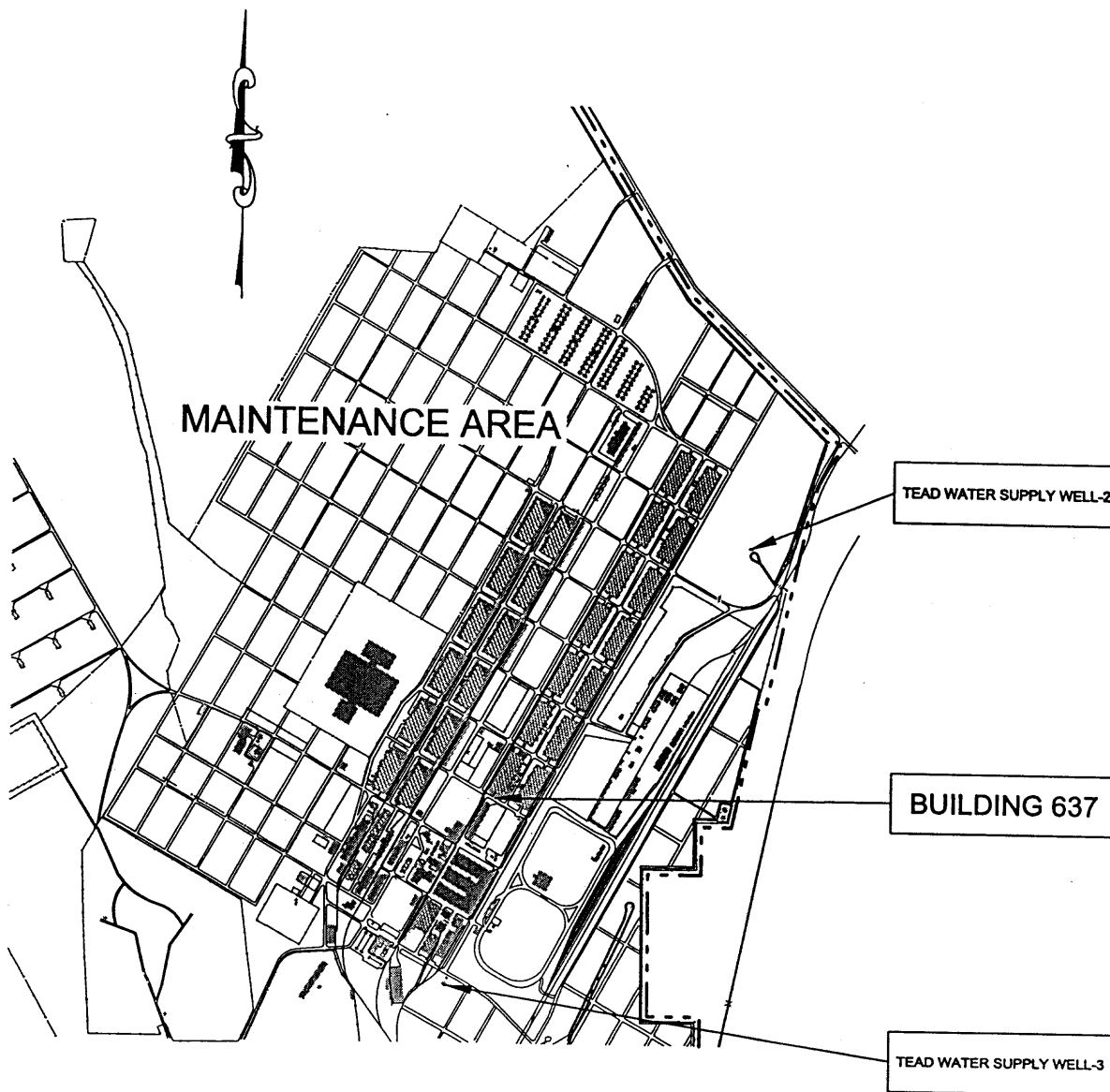
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SITE LOCATION MAP

TOOELE ARMY DEPOT
TOOELE, UTAH

FIGURE

1



SITE LOCATION MAP
BUILDING 637 NORTH LUST SITE

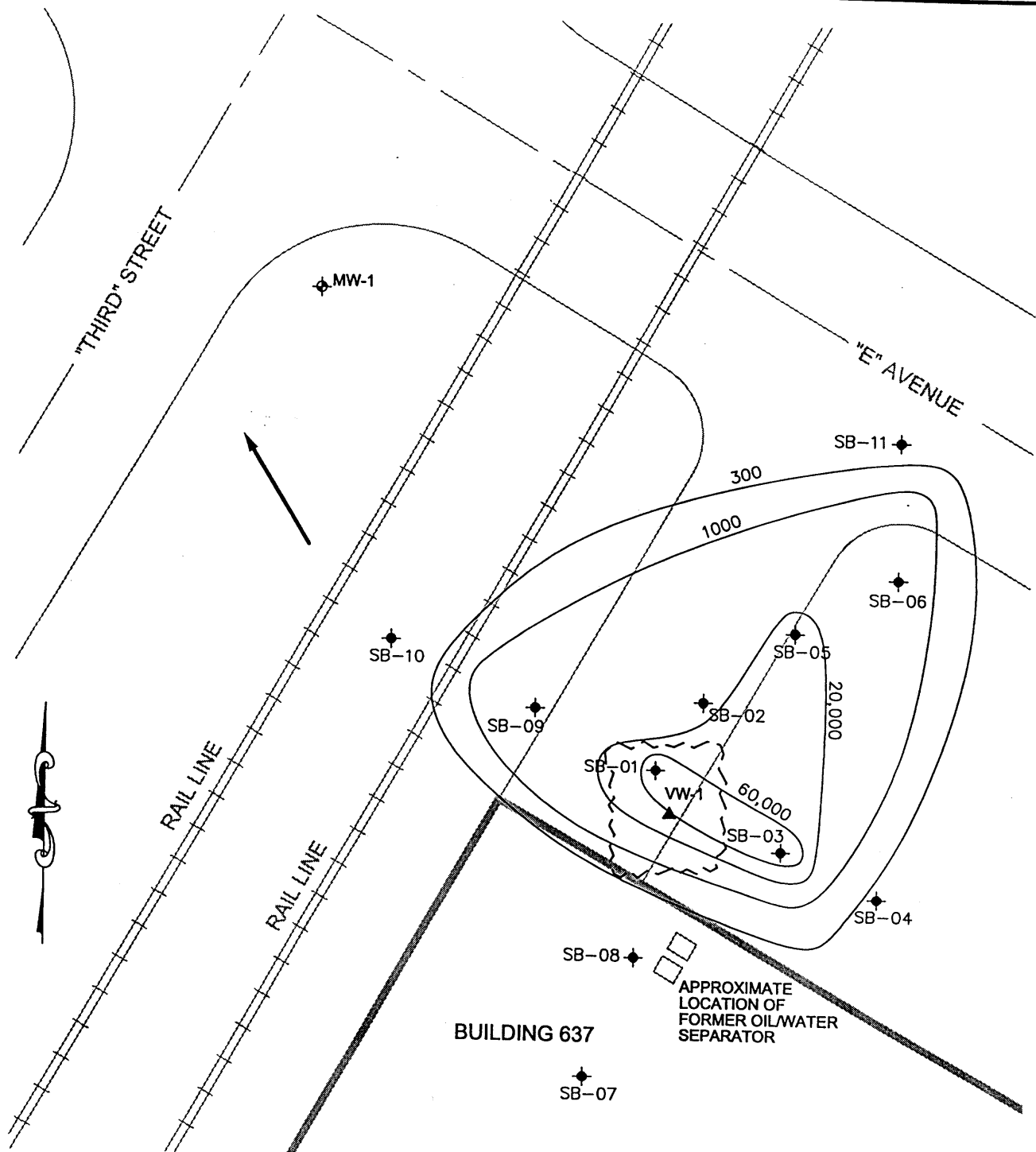
PLATE

2

Drawn By: R. PERSONIUS
Project No.: 23-900023-A12

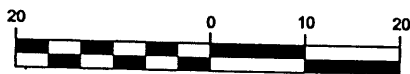
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TOOELE ARMY DEPOT
TOOELE, UTAH



LEGEND

- ◆ MW-# MONITORING WELL
- ▲ VW-# VENT WELL
- ◆ SB-# SOIL BORING



SCALE: 1 inch = 20 ft.

- TRPH (mg/kg) ISOCONCENTRATION CONTOUR
- - - - - APPROXIMATE EXCAVATION BOUNDARY
- APPROXIMATE GROUNDWATER FLOW DIRECTION

SOURCE: KLEINFELDER & JACOBS ENGINEERING, 1996



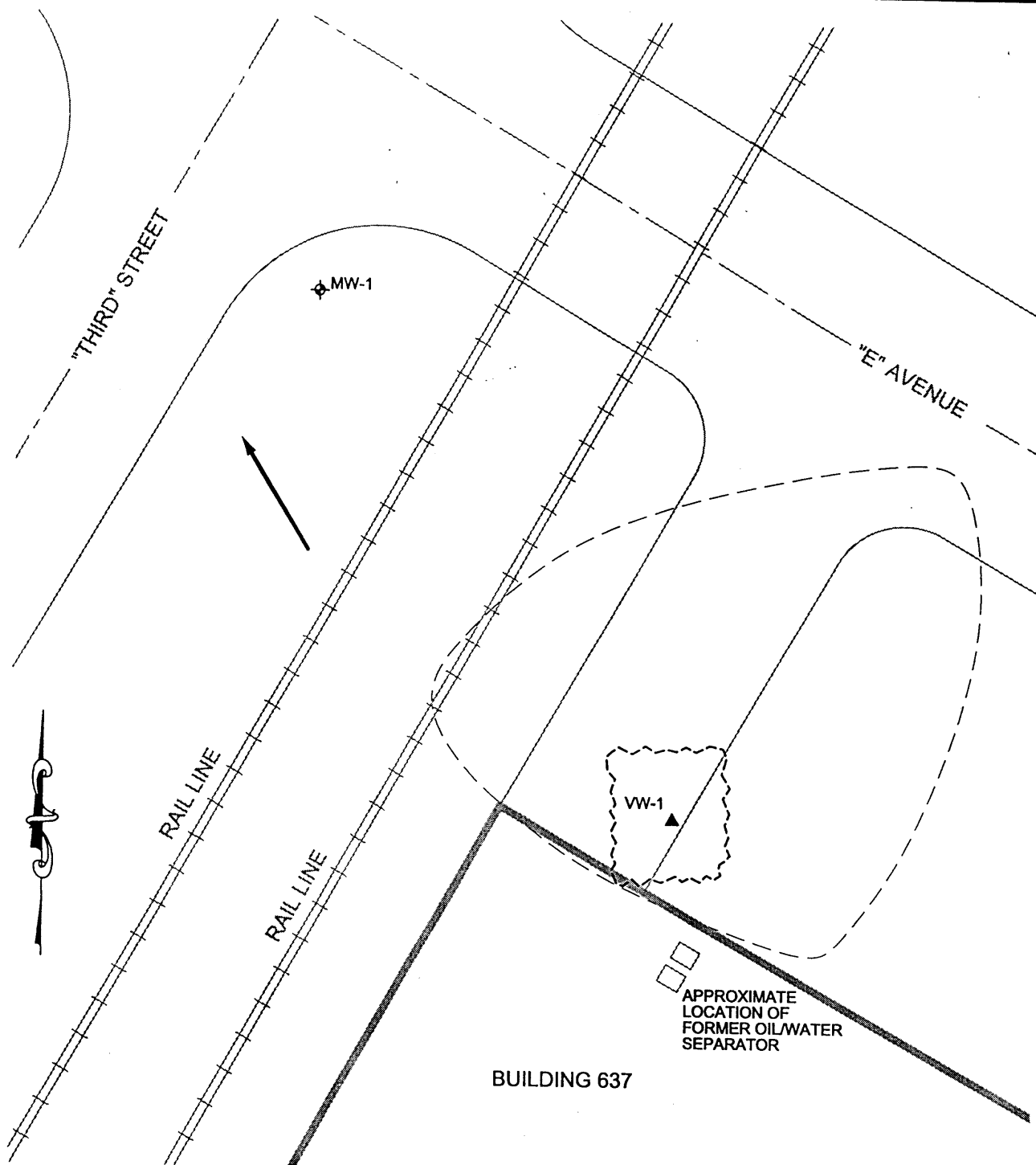
INITIAL INVESTIGATION SOIL BORING LOCATIONS
AND ESTIMATED TRPH CONCENTRATIONS
BUILDING 637 NORTH LUST SITE
TOOELE ARMY DEPOT
TOOELE, UTAH

PLATE

3a

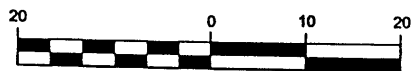
Drawn By: R. PERSONIUS
Project No.: 23-900023-A12

Date: 11-13-97
Filename: 1421C



LEGEND

- ◊ MW-# MONITORING WELL
- ▲ VW-# VENT WELL



SCALE: 1 inch = 20 ft.

- APPROXIMATE EXTENT OF PETROLEUM IMPACTED SOIL.
- APPROXIMATE EXCAVATION BOUNDARY
- APPROXIMATE GROUNDWATER FLOW DIRECTION



KLEINFELDER

WELL LOCATIONS AND ESTIMATED EXTENT OF
IMPACTED SOIL

PLATE

Drawn By: R. PERSONIUS
Project No.: 23-900023-A12

Date: 11-13-97
Filename: 1421D

TOOELE ARMY DEPOT
TOOELE, UTAH

4

APPENDIX B

- **SOIL BORING LOGS**
- **WELL CONSTRUCTION SCHEMATICS**
 - **FIELD NOTES**

SOIL BORING LOGS

DRILLING LOG		Hole No.	
PROJECT TEAD LUST sites - Adj. Characterist		LOCATION Tooth Army Depot (TEAD)	
1. LOCATION (Continuation of Section) Rd 637N LUST SITE		10. SIZE AND TYPE OF BIT 10" Drive Bit	
2. DRILLING AGENCY Kleinfelder		11. DATE FOR ELEVATION SHOWN (ITEM 10)	
3. HOLE NO. (As shown on drawing and not file number) VW-1		12. MANUFACTURER'S DESIGNATION OF DRILL Drill System AP-1000	
4. NAME OF DRILLER Cayne Christianson / Blair Wright		13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN DISTURBED UNDISTURBED	
5. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.		14. TOTAL NUMBER CORE BOXES	
6. THICKNESS OF OVERBURDEN N/A		15. ELEVATION GROUND WATER	
7. DEPTH DRILLED INTO ROCK N/A		16. DATE HOLE STARTED 4/8/97 COMPLETED 4/8/97	
8. TOTAL DEPTH OF HOLE 300'		17. ELEVATION TOP OF HOLE	
9. SIGNATURE OF INSPECTOR R.G.		18. TOTAL CORE RECOVERY FOR BORING	
19. SIGNATURE OF INSPECTOR R.G.		20. SIGNATURE OF INSPECTOR R.G.	

ELEVATION ft	DEPTH ft	LEGEND	CLASSIFICATION OF MATERIALS (Description)	SCORE RECOVERY %	BOX OR SAMPLE NO.	REMARKS (Drilling time, weight of logs, change of monitoring, etc., if significant)
10:40	0		Fill, Sand, med brown moist, loose, fine grained with some medium to coarse gravel			Strong wind NW-SE Partly Cloudy
10:45 10:50	10		Fill, SAA			grab at 5' 1043 PID = 5.7, BZ = 22
						grab at 10' 1100 PID = 9.6, BZ = 22
			- 5' GA			driller reports bottom of fill.
						grab at 15' PID = 44.4, BZ = 22
11:03 11:16	20		- 20' GA, silty gravel moist, loose to medium dense fine gravel 60-70% sub 6-1/2" & w/ some coarse gravel & fine cobbles, LS, & otolite			grab at 20' PID = 82, BZ = 22
			- 25' GW/GM - silty gravel & cobbles, yellow brown, moist medium dense, fine to coarse gravel 30-40% sub 6" to sub 8" cobbles 4" to 7" 40-50% sub 8"			grab at 25' PID = 82.9, BZ = 22
11:31 11:50	30		- 30' SAA			grab at 30' PID = 22.6, BZ = 22
			some interstratified layers of silty, yellow-brown moist med stiff			hard drilling
11:58	40		- 35' silty gravel & cobbles yellow brown to olive brown			grab at 35' PID = 9.6, BZ = 22
			- 37' CL - clay brown, moist soft, some silt, plastic visible oil stain			grab at 37' PID = 59, Scaplas USSP040401 US20040401 (duplicate)

PROJECT	HOLE NO.
TEAM 1. + 1.77N	UW-

DRILLING LOG		DIVISION		INSTALLATION		Hole No. UW-1	
1. PROJECT				10. SIZE AND TYPE OF BIT			
2. LOCATION (Coordinates or Section)				11. DAY ON FOR ELEVATION BROWN (TIME or AM)			
3. DRILLING AGENCY				12. MANUFACTURER'S DESIGNATION OF DRILL			
4. HOLE NO. (As shown on opening sheet and also numbered)				13. TOTAL NO. OF OVER-DRIVEN SAMPLES TAKEN			
5. NAME OF DRILLER				14. TOTAL NUMBER CORE BORED			
6. DIRECTION OF HOLE <input type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.				15. ELEVATION GROUND WATER			
7. THICKNESS OF OVERBURDEN				16. DATE HOLE			
8. DEPTH DRILLED INTO ROCK				17. ELEVATION TOP OF HOLE			
9. TOTAL DEPTH OF HOLE				18. TOTAL CORE RECOVERY FOR BORING			
				19. SIGNATURE OF INSPECTOR			
				R6 KA 1425			
ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX ON SAMPLE NO.	REMARKS (Drilling time, water loss, amount of overburden, etc., if significant)	
17:30	80	6w/6m	- 80' 6w/6m gravel & cobbles w/ some silt Lt olive brown, v. moist v. dense fine to coarse gravel 30-40% cobbles 3" to 4" 20-25%	0%	1-40 2-60 3-80	Drive at 40' 17:15 PID = 5.7	
17:45	90	6w/6m	- 85' SAA increasing moisture	0%	1-40 2-60 3-80	Drive at 85' 17:40 PID = 5.7 DTECH Sample collected > 25 ppm	
17:58	90	6w/6m	- 90' 6w/6m, SAA	0%	1-40 2-60 3-80	Drive at 90' 17:50 PID = 9.6 DTECH Sample collected > 25 ppm	
18:04	100	SP	- 92' SP, sand, brown moist, loose, fine grained, gravel to silt	100% 2 tubes	10 12 17	Drive at 95' 18:00 PID = 21.1 Sample 43SD040703	
18:14	100	CL	- 95' CL, clay, lt brown v. moist to wet, v. soft plastic	100% 2 tubes	10 12 17	Drive at 100' PID = 5.7	
18:20	100	6w/6m	- 98' 6w/6m gravel & cobbles w/ silt moist, dense fine to med gravel 30-40% cobbles 3" to 4" 30-40%	0%	1-40 2-60 3-80	Drive at 105' 09:45 PID = 5.7	
18:40	100	6w/6m	- 105' SAA	0%	1-40 2-60 3-80	Drive at 110' 09:52 PID = 21.1 Sample 43SD040501 DTECH Sample collected	
18:45	100	SP	- 108' SP, sand Lt brown moist, med dense v. fine grained, med	100% 2 tubes	10 18 20	Drive at 115' 10:04 PID = 13.4 Sample 43SD040502 DTECH Sample collected > 25 ppm	
18:50	100	CL	- 112' CL, clay, brown moist, v. stiff, odor	100% 2 tubes	10 18 20		
19:15	120	ML	- 115' ML, sandy silt, Lt brown, wet, med stiff v. fine grained, traces of fine gravel sub of original induration of Lt brown oil	100% 2 tubes	11 16 22		

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PROJECT

TEAD Lust 637W

HOLE NO.

UW-1

DRILLING LOG			DIVISION		INSTALLATION		Hole No.	
1. PROJECT			2. LOCATION (To include or Station)		3. SIZE AND TYPE OF BIT		4. STATUS FOR ELEVATION SHOWN (YES or NO)	
5. DRILLING AGENCY			6. MANUFACTURER'S DESIGNATION OF DRILL		7. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN		8. DISTURBED	
9. HOLE NO. (As shown on drawing title and file number)			10. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN		11. DISTURBED		12. UNDISTURBED	
13. NAME OF DRILLER			14. TOTAL NUMBER CORE BOXES		15. ELEVATION GROUND WATER		16. DATE HOLE	
17. DIRECTION OF HOLE <input type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.			18. STARTED		19. COMPLETED		20. ELEVATION TOP OF HOLE	
21. THICKNESS OF OVERBURDEN			22. TOTAL CORE RECOVERY FOR BORING		23. SIGNATURE OF INSPECTOR		24. HOLE NO.	
25. TOTAL DEPTH OF HOLE			26. SIGNATURE OF INSPECTOR		27. HOLE NO.		28. HOLE NO.	
ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	PERCENTAGE	TYPE OF SAMPLE	REMARKS (Drilling time, water loss, depth of penetration, etc., if significant)		
10:25	120	GM/6M	- 120' gravels & cobbles w/silt Olive brown, moist v. dense	0%	50/100 grab	Drive at 120 10:20 PID = 5.7		
			- 125' GM, mostly cobbles > 4"	0%	50/100 grab	Drive at 125' 10:30 PID = 5.7 Rig down 10:30 - 10:48 for repairs		
10:50 11:05	130		- 130' gravels & cobbles w/silt, olive brown moist, dense, some v. fine sand med to coarse gravel 30 to 40% sub 6 cobbles > 6", 30 to 50% - 135' gravels mostly cobbles > 8"	0%	50/100 grab	Drive at 130 ft 10:55 PID = 9.6 BZ = 6.2		
			- 135' gravels mostly cobbles > 8"	0%	50/100 grab	Drive at 135' 11:10 PID = 5.7		
11:25 11:31	140		- 140' - cobbles, S&A w/some gravels	0%	50/100 grab	Drive at 140 11:12 PID = 9.6 BZ = 6.1		
			- 145' cobbles & gravels S&A	0%	50/100 grab	Hard drilling Rig down 11:35 - 11:42 to fix loose hole Drive at 145 11:44 PID = 9.6 BZ = 6.2		
11:50 12:00	150	GM	- 150' GM silty gravel Olive brown, slightly moist for some v. fine sand gravel fine 50-60% sub 6	0%	50/100 grab	Drive at 150 11:52 PID = 5.7		
			- 153' ML, silt, olive brown moist and stiff	0%	50/100 grab	Drive at 153' 12:15 PID = 5.7		
			- gravel & cobbles w/silt	0%	50/100 grab			
			- 158' CL, clay, Lt Brown moist, soft trace silt	100%	100/100 grab	PID = 44.2 BZ = 4.2 Hard punch tube 10310040503 - DTBCH		

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PROJECT

1-74 35 ppm

HOLE NO.

TEAD LUL 314 631N UW-1

100-1743-

DRILLING LOG		Division		INSTALLATION		Hole No.	
1. PROJECT				10. HIR AND TYPE OF HIR		SHEET 6 OF 8 SHEETS	
2. LOCATION (Geographic or Station)		BLDG 637N		11. DATUM FOR ELEVATION SHOWN (FIM or AMSL)			
3. DRILLING AGENCY				12. MANUFACTURER'S DESIGNATION OF DRILL			
4. HOLE NO. (As shown on drawing title and log number)				13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN		DISTURBED UNDISTURBED	
5. NAME OF DRILLER				14. TOTAL NUMBER CORE BOXES			
6. DIRECTION OF HOLE <input type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.				15. ELEVATION GROUND WATER			
7. THICKNESS OF OVERBURDEN				16. DATE HOLE		STARTED COMPLETED	
8. DEPTH DRILLED INTO ROCK				17. ELEVATION TOP OF HOLE			
9. TOTAL DEPTH OF HOLE				18. TOTAL CORE RECOVERY FOR BORING		S	
				19. SIGNATURE OF INSPECTOR		R6 KA #1425	
ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water level, depth of penetration, etc., if significant)	
16:20	200	6u/6m	-200' 6u/6m gravel & cobbles w/ silt, SAA slightly moist	0%	150/211	Drive at 200' 16:20 PID = 5.7 retained hand packed tube	
4/5/97 17:10			-204' ML silt, Lt brown dry, v. stiff, trace clay moderately indurated	100%	50/50	Drive at 205' 17:00 Sample wireline SAA retrieved by overdriving retrieved at 18:10 PID = < 1.9 Sample U3SP040504	
4/1/97 11:12			-205' CC, clayey gravel olive brown, moist, dense, gravel med to coarse 40-60%	2+ tub	50/50		
12:25	210		-210' 6m, silty gravel olive brown, moist dry, fine to coarse 60-70%, sub d	75%	17/21	DTECH Sample 637N-6u/1-215 77m Drive at 210 12:15 PID = < 1.9 Sample U3SP040701	
			-215' 6m, SAA	100%	21/50	Drive at 215 w/ silt 13:00 PID = < 1.9 Sample U3SP040702	
13:10 13:22	220		-220' 6u/6m gravel & cobbles with silt, dry to slightly moist, dense	0%	50/60	DTECH Sample 1 to 5 ppm Drive at 220 13:15 PID = < 1.9	
			-225' 6u/6m, SAA gravel med to coarse 20-30% cobbles 3m > 12" 20-30% sub d to sub 2	0%	50/41	Drive at 225 13:30 PID = < 1.9 hand packed tube Sample U3SP040703	
14:10 14:18	230		-230' 6u/6m SAA dry	0%	50/42	Drive at 230 14:14 PID = < 1.9 hand packed tube Sample U3SP040704	
			-235' 6u/6m SAA	0%	50/61	DTECH Sample 1 to 5 ppm Drive at 235 14:30 PID = < 1.9	

DRILLING LOG		DIVISION		INSTALLATION		Hole No.	
1. PROJECT				10. SIZE AND TYPE OF BIT		SHEET 7 OF 8 SHEETS	
2. LOCATION (Coordinates or Station)		DUG 637 N		11. DAY OF YEAR FOR ELEVATION KNOWN (Y2K or 2000)			
3. DRILLING AGENCY				12. MANUFACTURER'S DESIGNATION OF DRILL			
4. HOLE NO. (As shown on ground plan and file number)				13. TOTAL NO. OF OVER-CORRECTION SAMPLES TAKEN		DISTURBED UNDISTURBED	
5. NAME OF DRILLER				14. TOTAL NUMBER CORE BORES			
6. DIRECTION OF HOLE				15. ELEVATION GROUND WATER			
<input type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.				16. DATE HOLE		STARTED COMPLETED	
7. THICKNESS OF OVERBURDEN				17. ELEVATION TOP OF HOLE			
8. DEPTH DRILLED INTO ROCK				18. TOTAL CORE RECOVERY FOR BORING			
9. TOTAL DEPTH OF HOLE				19. SIGNATURE OF INSPECTOR		Also see R6 KA # 1425	
ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	2. CORE RECOVERY %	3. CORE SAMPLE NO.	REMARKS (Including core, water level, depth of penetration, etc., if applicable)	
1455	240	GW	- 240' GW - cobbles w/ some gravel	0%	136	Drive at 240' 14:47 PID = 1.9 hand packed tube U35P040705 14:47 DTECH sample ≤ 1 ppm	
1537	245	GW/GM	- 245' GW/GM - gravel cobbles w/ silt, dry	0%	137	Lunch 15:00 to 15:30 Drive at 245' 15:42 PID = 1.9	
	250	GW/GM	- 250' GW/GM gravel & cobbles w/ silt dry, very dense fine to med gravel 20-40% cobbles 30-40%	0%	138	Drive at 250' 16:00 PID = 1.9 hand packed tube U35P040706	
	255	GW/GM	- 255' increasing cobbles possible boulders	0%	139	Drive at 255' 16:40 PID = 1.9	
16144 16152	260	GW/GM	- 260' GW/GM, SAA some boulders	0%	140	hard drilling Drive at 260' 16:46 PID = 1.9 hand packed tube U35P040707 DTECH sample ≤ 1 ppm	
	265	GW/GM	- 265' GW/GM SAA dry, very hard	0%	141	Drive at 265' 17:00 PID = 1.9	
16115 16117 0920	270	GW/GM	- 270' GW/GM SAA	0%	142	hard drilling Drive at 270' 17:15 PID = 1.9	
10100 10108	275	GW/GM	- 275' GW/GM, SAA	0%	143	hard drilling Drive at 275' 10:03 PID = 1.9 hand packed tube U35P040801 10:15 - 10:35 GW repositioning rig	

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PROJECT

TEAM

HOLE NO.

DRILLING LOG		DIVISION		INSTALLATION		Hole No.	
1. PROJECT				10. SIZE AND TYPE OF BIT			
2. LOCATION (Coordinates or Station)				11. DAY OF YEAR ELEVATION KNOWN (Y2000)			
3. DRILLING AGENCY				12. MANUFACTURER'S DESIGNATION OF DRILL			
4. HOLE NO. (As shown on drilling log)				13. TOTAL NO. OF CORES			
5. NAME OF DRILLER				14. TOTAL NUMBER CORE BOXES			
6. DIRECTION OF HOLE				15. ELEVATION GROUND WATER			
7. THICKNESS OF OVERBURDEN				16. DATE HOLE			
8. DEPTH DRILLED INTO ROCK				17. ELEVATION TOP OF HOLE			
9. TOTAL DEPTH OF HOLE				18. TOTAL CORE RECOVERY FOR BORING			
				19. SIGNATURE OF INSPECTOR			
				R6 KA 1425			
ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	NO. OF SAMPLES	REMARKS (Logging above, under logs, depth of penetration, etc., if significant)	
10'4"	280	6u/6h	-280 6u/6h gravel & cobbles w/ silt olive brown, dry v. hard gravel and to coarse ls & quartz 40-50% C-16613 > 6h 20-30% -285 SAA	100%	1	Drive w/ solid rods at 280 11:18 10:50 to 11:00 to place rods Sample # U3SP0408 02 PID = < 1.9 DTECH sample # 1ppa	
12:14	290	6u/6h	-290 6u/6h SAA	100%	1	Drive at 295' 11:54 PID = < 1.9	
12:25	300	6u/6h	boulders?	100%	1	Drive at 250 R'19 PID < 1.9 hard drilling	
12:15	300	6u/6h	-300 6u/6h gravel w/ silt, brown to yellow brown, slightly moist hard red gravel c/s & quartz	100%	1	Drive w/ solid rods at 300 12:05 setting rods 12:20-12:40 pulling rods 12:40-12:50 Sample # U3SP0408 03 DTECH sample # 1ppa	

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(TRANSFERENCE)PROJECT
TEAD Lost B142 037AHOLE NO.
UW-1

DRILLING LOG		DIVISION		INSTALLATION		SHEET	
1. PROJECT		USACE/Sacramento		100th Army Depot (TEAD)		1 OF 10 SHEETS	
2. LOCATION (Coordinates or Station)		TEAD Lust Site - Characterization		10. SIZE AND TYPE OF BIT		11. DAYUM FOR ELEVATION SHOWN (TBM or BENCH)	
3. DRILLING AGENCY		Kleinfelder		12. MANUFACTURER'S DESIGNATION OF DRILL		13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN	
4. HOLE NO. (As shown on drawing title and file number)		C-16		Drill Systems AT-1000		DISTURBED UNDISTURBED	
5. NAME OF DRILLER		Layne-Christensen / Blaine Wright		14. TOTAL NUMBER CORE BOXES		15. ELEVATION GROUND WATER	
6. DIRECTION OF HOLE		<input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.		16. DATE HOLE		17. ELEVATION TOP OF HOLE	
7. THICKNESS OF OVERBURDEN		N/A		STARTED 4/15/97		COMPLETED 4/16/97	
8. DEPTH DRILLED INTO ROCK		N/A		18. DATE HOLE		19. ELEVATION TOP OF HOLE	
9. TOTAL DEPTH OF HOLE		365 ft		4/15/97		4816.36	
				17. ELEVATION TOP OF HOLE		20. TOTAL CORE RECOVERY FOR BORING	
				4816.36		N/A	
				18. DATE HOLE		21. SIGNATURE OF INSPECTOR	
				4/15/97		Alm m. Lutz Rf	
ELEVATION TIME	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water level, depth of weathering, etc., if significant)	
4/15/97 09:14	0						
09:27 09:34	5	SW	5' SW, gravelly sand well graded, moist, med dense, sand fine to coarse sub 1/2 to 1/4 gravel med to coarse sub 1/4 to 1/2 to 3/4 cobbles 1 to 2 1/2% cobbles	0%	5/1	drive 0.5' 09:20 blocked by rock PID = 0 Hammer Pressure = 2000 lbs	
09:35 09:43	10	GM	10' silty gravel (G), Lt brown, slightly moist U. dense, silty matrix slightly cemented. gravels fine to med sub 1/4 to sub 1/2 to 3/4 to 1" cobbles 3/4 to 6" sub 1/2 to sub 3/4 to 1" - 2 1/2%	0%	5/2	Drive @ 10' 09:32 blocked by rock PID = 0	
09:52 10:00	20	GM	15' SAA 20' silty gravel, SAA gravel fine to med sub 1/4 to 1/2 to 3/4 cobbles 3" to 5" = 20 to 30% sub 1/2 to sub 3/4 to 1" cobbles	0%	5/3	Drive @ 15' PID = 0 Drill rate = 1 ft/min	
10:20 10:24	30	GM	25' silty gravel, SAA gravel fine to med sub 1/4 to 1/2 to 3/4 coarse sand fine gravel 1/4 to med gravel sub 1/4	0%	5/4	Drive @ 20' 09:56 PID = 0 blocked by rock 10:05 - 10:20 H/S waiting grab @ 20' PID = 0 Hammer Pressure = 3000 lbs	
10:30	35	GM	30' silty gravel, SAA		5/5	grab @ 30' PID = 0	
10:37	40	GM	35' silty gravel SAA		5/6	grab @ 35' PID = 0	

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(TRANSLUCENT)
SAA = same as abovePROJECT
TEAD Lust 637NHOLE NO.
C-16

DRILLING LOG		DIVISION		INSTALLATION		Hole No.		SHEET 2	
1. PROJECT		2. LOCATION (Coordinates or Station)		3. DRILLING AGENCY		4. HOLE NO. (As shown on drawing title and file number)		5. NAME OF DRILLER	
6. DIRECTION OF HOLE		7. THICKNESS OF OVERBURDEN		8. DEPTH DRILLED INTO ROCK		9. TOTAL DEPTH OF HOLE		10. SIZE AND TYPE OF BIT	
11. DATUM FOR ELEVATION SHOWN (TBM or MLL)		12. MANUFACTURER'S DESIGNATION OF DRILL		13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN		14. TOTAL NUMBER CORE BOXES		15. ELEVATION GROUND WATER	
16. DATE HOLE		17. ELEVATION TOP OF HOLE		18. TOTAL CORE RECOVERY FOR BORING		19. SIGNATURE OF INSPECTOR		20. REMARKS	
21. DATE HOLE		22. STARTED		23. COMPLETED		24. SIGNATURE OF INSPECTOR		25. REMARKS	
ELEVATION TIME	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)			
10:46 4/5/97	40		- 40' silty gravel SAA lt olive brown gravel w/ some cobbles	0%	30/30	drive @ 40' 10:38 PID = φ			
			- 43' clay (CL), lt brown moist, med stiff, plastic some v. lt brown, varying trace silt	100%	21 34 40	drive @ 45' 10:45 PID = φ Sample # U3SP041501 @ 11:02			
10:53 10:59	50		- 50' silty gravels (GM) lt olive brown, moist some cobbles silty matrix moderately cemented.			grab @ 50' Hammer pressure ≈ 6000 lbs			
			- 55' silty gravels, SAA gravel fine to coarse sub φ ≈ 40-40% cobbles 2 to 6" sub φ 10 to 25% LS / organic			grab @ 55' PID = φ			
11:10	60		- 60' increasing gravels	0%	50/50	drive @ 60' 11:12 PID = φ			
			- 64' cobbles			11:15 - 12:45 rig down for repairs - 62 to 64' hard drilling grab @ 65'			
12:56 12:00	70		- 70' silty gravels (GM) dry, lt brown to brown gravel med to coarse sub φ to sub φ 40 to 50% cobbles 2" to 12" sub φ to sub φ 30 to 40%			v. hard drilling Hammer force = 8000 lbs grab @ 70' PID = φ			
12:40 12:45			- 75' silty gravels (GM) SAA, olive brown alternating dry to moist every 3 to 5'			13:00 - cutting return line plugged. grab @ 75' PID = φ drill rate ≈ 1 ft / 1 min			

DRILLING LOG		DIVISION		INSTALLATION		SHEET 4 OF 10 SHEETS	
1. PROJECT TEAD				10. SIZE AND TYPE OF BIT			
2. LOCATION (Coordinates or Station) Dwg 637N				11. DAYTON FOR ELEVATION SHOWN (1982 = 1982)			
3. DRILLING AGENCY				12. MANUFACTURER'S DESIGNATION OF DRILL			
4. HOLE NO. (As shown on drawing title and file number) C-16				13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN		14. TOTAL NUMBER CORE BOXES	
5. NAME OF DRILLER				15. ELEVATION GROUND WATER		16. DATE HOLE STARTED	
6. DIRECTION OF HOLE <input type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.				17. ELEVATION TOP OF HOLE		18. TOTAL CORE RECOVERY/FOR BORING	
7. THICKNESS OF OVERBURDEN				19. SIGNATURE OF INSPECTOR <i>[Signature]</i> RG, KA # 1475		20. REMARKS (Drilling time, water logs, depth of penetration, etc., if significant)	
8. DEPTH DRILLED INTO ROCK							
9. TOTAL DEPTH OF HOLE							
ELEVATION TIME	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS	
1442	120	GM	- 120' silty gravel (GM) olive brown	0%	120	drive @ 120' 14:38 PID = ϕ	
			- 122' silt pocket (GM) olive brown moist trace fine gravel			grab @ 125' 14:48 PID = ϕ	
			alt dry to moist turning 3 to 5'			drill rate slowing	
1450			- abundant cobbles 3 to 5 1/2"				
1457	130	GM	- 130' gravel & cobbles (F) fine fines, u. dry fine to coarse, well graded.			grab @ 130' 14:58 PID = ϕ	
			- 135' silty gravel (GM) olive brown, alt dry to moist gravels fine to med = 40 to 60%, sub ϕ cobbles 3" & > 6" 10-20% sub ϕ to sub ϕ			1401-1404 break	
1507			- 140' silty gravel (GM) SAA			grab @ 135' PID = ϕ	
1519	140	GM	alternating dry to moist every 3 to 5' silty matrix slightly cemented.	0%	5/5"	1507-1511 clear hole	
			- 148' abundant cobbles (GM) fine to coarse cobbles 3" & > 6" sub ϕ 2.5" white, fine fines alt dry to moist			drive @ 140' 15:12 PID = ϕ	
1527			- 156' silty gravel, (GM) lt brown, matrix strongly cemented; dry gravels fine to med sub ϕ possible calcareous cement			seal compressor turned on	
1531	150	GM				grab @ 145' 15:25 PID = ϕ	
						air line 750 CFM @ 250 PSI	
1545						grab @ 150' 15:29 PID = ϕ	
16:40	160	GM				drill rate slowing u. hard	
						15:35-15:40 clear hole	
						grab @ 155'	
						hammer force = 8800 lbs	
						15:45-16:40 rig down to cool.	

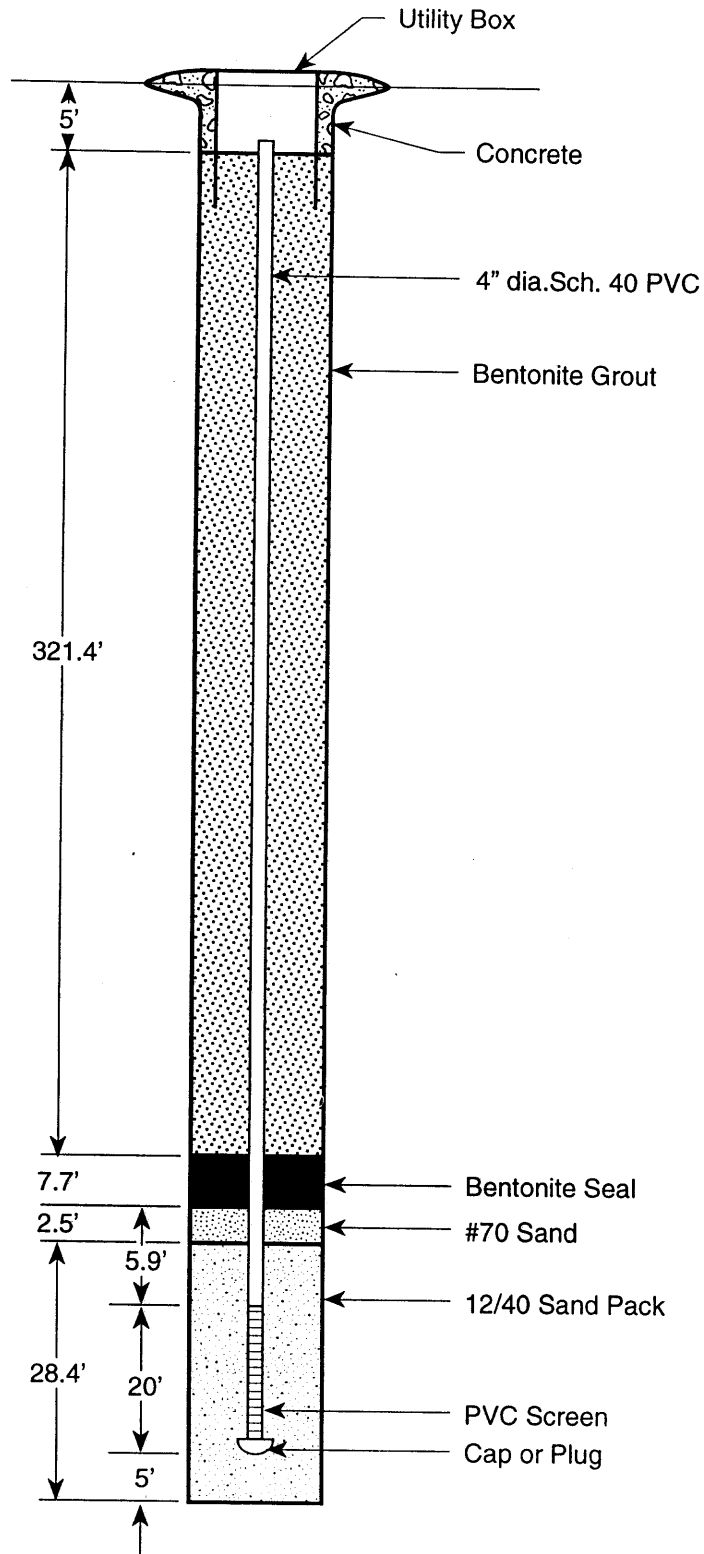
DRILLING LOG		DIVISION		INSTALLATION		Hole No.	
1. PROJECT TEAD		10. SIZE AND TYPE OF BIT		SHEET 6		OF 1- SHEETS	
2. LOCATION (Coordinate or Station) BIG 637N		11. DATUM FOR ELEVATION BROWN (TBM - REL)		12. MANUFACTURER'S DESIGNATION OF DRILL			
3. DRILLING AGENCY		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN		DISTURBED		UNDISTURBED	
4. HOLE NO. (As shown on drawing title and file number) C-16		14. TOTAL NUMBER CORE BOXES		15. ELEVATION GROUND WATER			
5. NAME OF DRILLER		16. DATE HOLE		STARTED		COMPLETED	
6. DIRECTION OF HOLE <input type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.		17. ELEVATION TOP OF HOLE		18. TOTAL CORE RECOVERY FOR BORING			
7. THICKNESS OF OVERBURDEN		19. SIGNATURE OF INSPECTOR R. B. KA # 1425		20. SIGNATURE OF DRILLER			
8. DEPTH DRILLED INTO ROCK		21. SIGNATURE OF DRILLER		22. SIGNATURE OF DRILLER			
9. TOTAL DEPTH OF HOLE		23. SIGNATURE OF DRILLER		24. SIGNATURE OF DRILLER			
ELEVATION FMS	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)	
0410 0412	200	6u/ft	- 200' silty gravels w/ cobbles (6u/ft) dry, v hard, strongly cemented silty matrix alternating dry to moist every 3 to 5'	0%	50/4	drive 200' @ 17'52"	
0852 0901	210	6u/ft	- 210' silty gravels w/ cobbles. SAA gravels med to coarse sub & x 40-60% cobbles 3" x 6" sub & to sub & 20-30%		grab	0835-0841 repair & ring & clear hole	
			- 214 encrusting boulders fragments suggest > 12" mostly ls & quartz slightly moist		grab	grab 205' 0845 PID = φ	
0917 0934	220	6u/ft	- 220' silty gravels w/ cobbles (6u/ft) occasional boulders gravels med to coarse sub & x 40-60% cobbles sub & x 20-30%	0%	50/5	hard drilling drill rate = 1 ft/2 min	
			- 225 primarily cobbles few fines 3" x 12"		grab	grab 210' 0854 PID = φ	
0942 0953	230	6u/ft	- 230 SAA cobbles 6 to 12"		grab	thrust force = 8800 lbs hard drilling 0907-0910 clear hole	
			- 235 SAA silty matrix moderately cemented, moist w/ some clay		grab	grab 215' 0914 drill rate = 1 ft/1 1/2 min air flow = 750 cfm @ 250 psi	
1002	240	6u/ft			grab	drive 220' 0920 PID = φ	
					grab	- slow drilling	
					grab	grab 225' 0939 PID = φ	
					grab	drill rate = 1 ft/1 1/2 min	
					grab	grab 230' 0947	
					grab	0945-0950 clear hole	
					grab	slow - drilling	
					grab	grab 235' 10:00	
					grab	drill rate = 1 ft/2 + 3 min	

DRILLING LOG		DIVISION		INSTALLATION		Hole No.		SHEET	
1. PROJECT TEAD		2. LOCATION (Coordinate or Station) Bing 637N		10. SIZE AND TYPE OF BIT		11. DATUM FOR ELEVATION SHOWN (TBM or BM)		OF 10 SHEETS	
3. DRILLING AGENCY		4. HOLE NO. (As shown on drawing title and file number) C-16		12. MANUFACTURER'S DESIGNATION OF DRILL		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN		DISTURBED	
5. NAME OF DRILLER		6. DIRECTION OF HOLE <input type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.		14. TOTAL NUMBER CORE BOXES		15. ELEVATION GROUND WATER		16. DATE HOLE	
7. THICKNESS OF OVERBURDEN		8. DEPTH DRILLED INTO ROCK		17. ELEVATION TOP OF HOLE		18. TOTAL CORE RECOVERY FOR BORING		19. SIGNATURE OF INSPECTOR R. G. KA # 1425	
9. TOTAL DEPTH OF HOLE		10. DATE HOLE		11. DATE HOLE		12. DATE HOLE		13. DATE HOLE	
ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	SCORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water logs, depth of penetration, etc., if applicable)			
4/16/97 10:13	240	GW/GM	- 240 silty gravel w/ cobbles occasional boulder 4 brown silty matrix moderately cemented att dry to moistening 3 to 5" v hard	0%	5/16"	drive 240' 10:17 grab 240' 10:19 PID = ϕ hard drilling drill rate = 1 ft/2 min			
10:33 10:46	25		- 250' silty gravel w/ cobbles (GM/GM) v hard silty matrix 4 brown to white		grab	grab 245' 10:29 PID = ϕ 10:29-10:30 clear hole 10:30-10:46 full hammer			
10:54 11:01			- 255' silty gravel w/ cobbles (GM/GM) SAA gravel fine to coarse sub ϕ to sub ϕ & 3 to 6% cobbles 3" to 6" sub ϕ 20 to 30% silty matrix olive brown w/ some clay strongly cemented in layers		grab	grab 250' 10:48 PID = ϕ drill rate = 1 ft/2 min			
11:12 11:12	260	GW	- 255' silty gravel w/ cobbles (GM/GM) SAA gravel fine to coarse sub ϕ to sub ϕ & 3 to 6% cobbles 3" to 6" sub ϕ 20 to 30% silty matrix olive brown w/ some clay strongly cemented in layers		5/16"	grab 255' 10:55 PID = ϕ 10:54-10:58 clear hole Hammer force = 8800 LBS 11:04-11:08 clear hole			
11:23 11:29			- 262' primarily cobbles, clay cemented silt matrix		grab	drive 260 11:14 PID = ϕ hard drilling drill rate = 1 ft/1.5 min			
11:42			- 264' fragments suggest large cobbles > 8" w/ some boulders few fines, dry		grab	drill rate = 1 ft/4 min 11:23-11:29 clear hole			
11:54 12:03	270	GW	- 268' fragment of boulder suggest 16 to 32" LS		grab	grab 265 11:41 PID = ϕ v. hard drilling drill rate = 1 ft/3 min 11:44-11:48 clear hole			
12:07 12:09			- 270' gravels w/ cobbles GM, some silt gravel med to coarse sub ϕ to sub ϕ 20-40% cobbles 3" to 8" 30-60% silt, 4 brown dry cemented in layers		grab	grab 270 @ 12:05 PID = ϕ 12:04-12:09 clear hole			
12:15			- 275' SAA		grab	drill rate 1 ft/2 min			
12:22			- 276' silty gravels (GM) 4 olive brown silty matrix		grab	grab 275' 12:22 PID = ϕ 12:23-12:27 clear hole			

HOLE NO.
C-16

DRILLING LOG		DIVISION		INSTALLATION		Hole No.	
1. PROJECT TEAD		10. SIZE AND TYPE OF BIT		11. DATUM FOR ELEVATION SHOWN (TBM or BBL)		SHEET 10 OF 10 SHEETS	
2. LOCATION (Coordinates or Station)		12. MANUFACTURER'S DESIGNATION OF DRILL		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN		DISTURBED UNDISTURBED	
3. DRILLING AGENCY		14. TOTAL NUMBER CORE BOXES		15. ELEVATION GROUND WATER		16. DATE HOLE STARTED COMPLETED	
4. HOLE NO. (As shown on drawing title and site record)		17. ELEVATION TOP OF HOLE		18. TOTAL CORE RECOVERY FOR BORING		19. SIGNATURE OF INSPECTOR	
5. NAME OF DRILLER		18. ELEVATION TOP OF HOLE		19. SIGNATURE OF INSPECTOR		20. SIGNATURE OF INSPECTOR	
6. DIRECTION OF HOLE <input type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.		19. SIGNATURE OF INSPECTOR		20. SIGNATURE OF INSPECTOR		21. SIGNATURE OF INSPECTOR	
7. THICKNESS OF OVERBURDEN		20. SIGNATURE OF INSPECTOR		21. SIGNATURE OF INSPECTOR		22. SIGNATURE OF INSPECTOR	
8. DEPTH DRILLED INTO ROCK		21. SIGNATURE OF INSPECTOR		22. SIGNATURE OF INSPECTOR		23. SIGNATURE OF INSPECTOR	
9. TOTAL DEPTH OF HOLE		22. SIGNATURE OF INSPECTOR		23. SIGNATURE OF INSPECTOR		24. SIGNATURE OF INSPECTOR	
ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)	
1129 4/18/97	360	GM	- 360' silt gravel (GM) lt olive brown to yellow brown, wet, hard gravel med to coarse 10-15 50-70% occasional cobble silty matrix w/ trace fine sand	0%	50/11	no drive @ 360' due to sluff 1130-1145 rig having hard time lifting cuttings drive 365 11:52 grab 1145-1215 clear hole, flow w/ clean water air circulate out	
1145	370		TD = 365' Monitoring well Constructed on 4/19/97 4/20/97				

WELL CONSTRUCTION SCHEMATICS



NOT TO SCALE



MONITORING WELL CONSTRUCTION DETAIL
BUILDING 637 NORTH LUST SITE

Drawn By: R. PERSONIUS
Project No. 23-900023-A13

Date: 4/14/98
Filename: 1631B.fh7

TOOELE ARMY DEPOT
TOOELE, UTAH

FIELD NOTES

4 April 1947

Friday

8:00 Danny & Alex (Klein felder) & Blaine
& Chris (Layne) are at 637 North.

- Layne crew is setting up the rig Danny & Alex are preparing field gear
- Calibrated P.T.D. Post Calibration Check = 100 PPM
- Layne setting up drill rig, Placed on plastic 150 ft of triple wall pipe onsite
- 4 samples for Lab
 - 1 from 2-in. of Cont
 - 2 from below
 - 1 from TD
 - TD 50 ft below Cont

0945

Hall's Safety meeting
Getting triple wall set up

10:30

Starting to drill VW-1, 637 N

12:20

- Encountered a clay layer @ 37 ft
drove a sample @ 38 ft
- Collected 2 samples, 1 primary, 1 dup
- V3 SP 040401, 12:20, 38 ft, full tube
- V3 SR 040401, "10:00", "20 ft", full tube
- ↖ ↗ actually 12:20's 58 ft, duplicate

12:45

- Collected rinsate blank from spoon used to sample 38 ft
- There was free oil in the sample, soil was clay
- V3 WR 040401, 12:45-

13:50

Ht. another clay layer @ \approx 44 feet

Collected a split spoon sample @ 45 feet, had
3 full brass tubes, so we collected a
duplicate and a primary:

U3SP 0404 02, 45 ft, 13:50

U3SP 0404 02, "30 ft", "14:30"

attempted sample @ 50 ft is gravel / rubble
50/5" w/ only 75% of 1 tube

14:20

drillers break for lunch

14:50-

Drilled & drove sample @ 55, 60, 65, 70 w/ 0% recovery

16:25

no perched water encountered

In general PID readings dropped off.

Denny H. & Carl discussed trying triple well

Drove triple well flush to ground w/ TD = 70 ft

Continued drilling to 105 ft

Encountered 2 ft sand, v. fine & 4 ft silt &

clay approx 92 to 98 ft

true indications of oil in clay,

clay saturated w/ water (wet), but

no free water was observed.

Collected following samples on 4/4/97 NW-1

Time

#

Depth

Type

12:20

U3SP 0404 01

38 ft

Soil

12:20

U3SP 0404 01

11 (70 ft)

duplicate, Dummy time & depth

12:45

U3WQ 0404 01

—

Rinse

13:50

U3SP 0404 02

45

Soil

17:50

U3SP 0404 02

11 (30 ft)

dupl., Dummy time & depth

18:00

Completed drilling today - depth 105 ft

Note

Samples retained with Alex Richards

18:30

Left site

4/5/97

Bldg 677 N Day 2 VW-1

85

Crew - Alex Richards (Kb)

Layne - Blair

Cloudy

Chris

Very cold = low 30s

Phil

Louie

0730

KA geologist onsite

0800

Carl Cole stopped by. Provided job status update

0820

Layne crew arrives

Start equipment. Very cold < 32° & windy

Warm up equipment

I calibrated PID & set LEL meter

0940

Started drilling @ 105 ft

fine grained soils between 110 & 120

Obtained drive samples @ 110 & 115 ft

1020

Carl & stopped by for update

Small silt pocket @ 152 to 154 - no sample

Clay pocket @ 158 ft, picked brass tube with material

Sample. PID = 44 ft

1230

@ 160 ft CM/GW drillers took lunch

Cannot find DTECH soil extraction kits

Called Dave Shack & left message

Joe Oliphant arrives to run details

DTECH Re: Joe Oliphant

DTECH w/ PAH kit

95' > 25 ppm

92' > 25

115' > 25

158' 10 to 25 ppm

1300

Carl stopped by for status

1425

Clay pocket encountered at 110 ft

86

1440

PID begins to falter. Low Battery.
Could not charge previous night due to
damaged activation pin in charger jack on PID

Continued to collect samples (grab) for
screening

Gravel & cobbles encountered to 204
Silt @ 205 ft.

1600

Carl & I went to South base to
plug in PID and screen soil samples

Returned to find Layne driving at 205 ft
Sampler cable broken. Sampler lost &
must be retrieved

Called Dave Shank & gave status update

17:00

Layne over drive to retrieve sampler
first attempt failed.

Carl Cole & Dave Shank discussing by (Telephone)
how to proceed. They decided that
although PID results show low VOCs below 162
they wish to confirm ~~the~~ bottom of
contamination based on undisturbed sample
hopefully material retrieved at 205

18:10

Sampler retrieved. Collected sample 432040503
Also collected DTECH sample # 6370-10-1-205
for analysis

13:15 to 19:15 Drillers cleaned up site. Had briefing w/ car.
 Drive sampler broken. Cannot be repaired
 till Monday. Therefore no drilling on
 Sunday 4/6/97

— Alex Richards

End 11

4/7/97

TEAD project - Bldg 637N site VW-1
 22-900026 - A22 KA - Alex Richards
 Logue - Blain

0730

At Alex R. @ office to drop off time sheet & get
 supplies

0800

Loaded truck & went to Port Stokes L-6

Dropped off sample DTECH 637N - VW1 - 205 to
 Joe Oliphant for analysis

0900

Arrived at site. Logue crew replacing cable
 for wireline sampler

Called Joel Oliphant result for sample

637N - VW1 - 205 is > 700 ppm (Oil) PAH analysis

10:00-11:30

Waiting for Logue

Blain out getting ??

1150

Drilling @ 210 Hammer broken using Rods
 Sampling w/ S/XO using rods

1310

Drillers fixed wire line - ready to go

Sampling every 5 ft. mostly cobbles w/ areas of boulders
 to

Had packing brass tubes w/ cuttings every 10 ft.

1500
88

Dave Shank & Roy stopped by
brought PID as backup

Dive to sample from 215 to Top O. R. DTECH analysis

1715

Reached TD for today ~~275'~~ 270'

Samples collected

ID	depth	PID	Time
U3SP040701	210'	<1.9	1215
U3SP040702	215		1300
3rd U3 SP040703	225'		1330
U3SP040704	230		1400
U3SP040705	240'		1447
U3SP040706	250'		1600
U3SP040707	260'		1646

Visitors: Carl C. (COE)

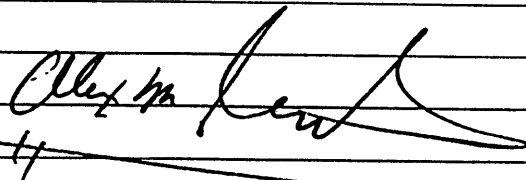
Dave Shank (KA)

Roy — (KA)

Larry McFarland (COE)

Tim — (Layne)

End


4

4/6/87

Turtle Army Dyot / Bldg 637N
Drilling at CW-1

Crew - Alex Richards KA-geologist

Logue - Black Wright / Chris — / Louie —

0730

KA & Logue onsite

starting equipment / warning

0730

Calibrated FID

ambient air = 0

100 ppm Toluene = 100

H.S. Martin

Talked to Dave Shook sample @ 215

had 1- to 5 ppm TPH \approx 25-100 #2 oil

Drive rods @ 280'

Shooked Joe Whigham to come out & run

PTCH samples @ 1 Pm

0845

Carl stopped by & discussed sampling

Continue drilling until receive PTCH results

try for undisturbed samples - look for soft zone

Use solid rods for sampling if drillers will go for it

Collected drive sample @ 280' using rods

1 Gross tube & 1 PTCH sample using

PAH ext test, Filled plunger 2.

After, reading directions, should fill plunger only once. It will tell Joe O. so he can compare.

Ditch

PTCH

Samples selected for DTECH analysis

1 ppm

280

discrete

10 ppm

280

hard packed cutting

1 ppm

280

hard packed cuttings

90

14:00

< 1 pen

< 1 pen

Submitted samples to Joe for analysis

240

300

1430

Carl onsite waiting for DTECH results
~~But~~ Drillers waiting - waiting to know if we
need to go deeper.

Joe C. presents results. Dave & Carl decide that
300 feet is deep enough. we are at least
50 ft beyond contamination.

17:00

Drillers cleaning up site & preparing to build well tower.
Dave Shank wants boring log for well
design. Returned to hotel to clean up log.

1730

- Drillers & KA geologist leave site

4/9/97

end of

Alex to finish

BLDG 637N / NW-1 / Snowing - v. cold

07:50

Alex went to attic to deliver boring log
& notes to Dave Shank. Packed soil &
water samples for FedEx delivery to
Thompson Analytical

0820

Called Blaine Wright of Lapeer to go over
well construction details

Conducted misc office work

1445 Placing #10/20 sand to 180 ft

1500-1600 Pulling conductors to 160 ft

16:00 Placing sand

16:30 sand at 165, Conductor at 160
Sanded to 158

1645 - Pulled conductor to 120

17:15 Placing sand.

17:40 Band tagged at 115
Pulled conductor to 90 ft

Placing bentonite seal

1800 - Placing bentonite seal from 115 to 98

1820 - 9 buckets

1820-1845 - Pulled conductor to 70 ft

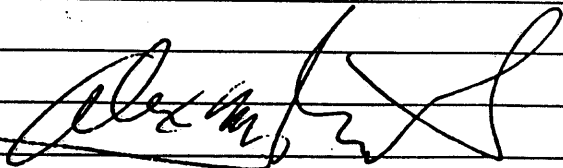
Finished for today

19:00 hrs left site

Visitors

Carl Cole

End



4/10/57 TEAD Building 62N - NW-1

VA - Alex Richards League - Alex Wright
Louie

0800 VA Geo. Wright

0830 League arrives

Cold / Windy

Blaine reports that so far
we have used 55 bags of sand;
22 buckets of Gerdite

08:30 - 0900 Taped out all of dual casing
beginning to set 2" well for Dave Tenkine ^{Spent}
Pulled 20 ft of triple well, bottom @ 30

Blaine tagged hole bottom @ 98' - no cave in

~~Point~~ Constructed sand zone ~~from~~ from
67 to 98 ft used - 11 sacks

Placed 2" well
Screen from 60 to 90

0930 Placed Gerdite from 62 to 67 ft - 6 buckets

10:00 ~~Pulled 10 ft of triple well, bottom at 40' 40' ft~~

Constructing filter pack from 62 to 37'

Placed 6 sacks of sand

Pulled 10 ft of triple well, bottom at 40'

1020 Continuing building filter pack, placed 2 sacks

10:30 Pulled 10 more ft of triple well

finished sending to 37'

1040 Placing Gerdite 30 to 37' - 7 buckets
hydrated. Top of soil tagged @ 30 ft

1100 - Pulling remain triple well to 20 ft by 8

1200 - Drillers cleaned up area & prepared to graft.

1200 - 1300 Grafted 0 to 30 ft, pulled last 20 ft
of triple well. Used 5 bags of ben seal 2 4-55.1 ^{drains}

13:00 - 14:00 finished cleaning up area

1400 → 1600 Blaine & Louie took truck with the triple well
back to their yard in Salt Lake

16:00 I had Blair set green stake pins around well for protection until temp fence is brought in

16:00-17:00 West ~ / Dave Shank, Carl Cole to meeting
w/

Visitors: Carl Cole

Dave Shank

Mary Ellen

Larry McFarland

and - Doug K. Hunt

4/14/27 Blug 637N ~~C-16~~ Well C-16

Drillers Decord & set up on hole C-16.

Dave Shank & Carl Cole onsite to review drill location & utilities.

C-16 location approx 180 ft NW of Vw-1

Bldg - 637N Well C16 Day - 1
 4/15/97 VA - Alex Richards Logue: Blair Wright

0800 - Logue & VA personnel onsite
 setting up well C-16

Inspected dual-well casing appears to be
 very clean & adequately decontaminated

0815 Col. water PID & ~~sample~~ washed
 samples

0900 Carl Cole stopped by. Discussed sampling &
 cuttings management

0914 Started drilling

0930 Logue Calif HHS officer contacts site
 inspection
 Talked to Blair about using drive rods
 for sampling. He said if we do it

No PID readings between ≈ 35 ft
 starting to spread cuttings on ground surface

43 to 48 ft clay encountered PID ≈ 1.0

1105 Reg down, large cable tangled
 Carl Cole here to observe lift @ 11:40

1140 Rig fixed / Cilled dry block # 43WQ 041501 @ 11:15
 - Resume drilling

← Cuttings return line plugs often @ cyclone or
 top of dual-casing

1545

@ 160 ft Blaine wants to shut rig down & allow top head to cool.
from 140 to 160 abundant cut cobbles. 2nd compressor turned on to help eject cuttings.

16:00-1800

Continue drilling & sampling every 20. No running head grouts & cobbles up some silt
to TD @ 200 ft.

18:30

Cleaned up area spread cuttings & left site

Total Footage today 0 to 200 = 200 ft

End

4/16/87

B/Lg 637N well C-16 Day 2

KA - Alex Richards

Layne: Blaine Wright & Co.

0800

KA too in ~~the~~ Toole to find copier for forms & logs - Norm found one.

0820

Orate. Layne came clearing out hole

0830

started drilling from 200

0830

Carl Cole stopped by - upset that we were not using rods to sample.

I told him that we would @ gas interface & @ 350 ft.

1200

drilling getting v. hard, slow about 1 ft / 2 to 4 min

- 1256 @ 280 ft broke for lunch & got supplies & copy
drill log forms
- 13148 started drilling. Extremely hard into
cemented ~~boulders~~ boulders & cobbles
- 1501 driller went to get more dual-well casing
Carl Cole stopped by to check on progress
Called Dave Shuck to give update. Not in, left message
- 1600 Continued drilling no problems
V. hard alluvium - harder w/ depth
- Approaching
16:45 Approaching 300 ft. Will start sampling every 5 ft
- 17:30 Reached 310. End for today. Talked w/
Dave Shuck regarding well construction specs
Total Footage today 200 to 310 = 110 ft
No Samples Collected

End

4/17/97

BLDG 637N well C-16 Day 3
Crew: UA = Alex Richards
Driller = Blaine Wright & Co. (Layne)

0745

UA per onsite. Layne already here
Layne warming up equipment. I cleaned
samplers & calibrated PID

0820

Appears to be something wrong with rig @ top head

0830

Carl Cole arrives. Alma Griets up at
~~later~~ Later on hammer broken. will take approx
2 hrs to fix. Broke on start up.

- Went to town to gas truck & wash off oil
from drill rig & house exhaust
- Rig fixed start drilling @ TR 10:40

10:20

13:11

Gravel & cobbles to 330 ft
 Drive @ 330 ft w/ solid rods
 no recovery w/ wireline

13:30

Blaine reports hot man
 Denver - Gardner air compressor not working
 Appears to be fuel pump
 Due to depth & large cuttings he
 doesn't want to drill until repaired

14:00

Layne Muecke out to inspect air compressor
 Muecke goes to Salt Lake for Fuel Pump

16:00

Muecke returns and installs fuel pump.

16:30

Air Compressor won't start. Fuel lines dry
 trying to prime.

17:00

Blaine aborts drilling for today. They
 will stay to try to get it started.

17:15

Left site

Total Footage today 300 to 330 = 30 ft

~~11~~

4/18/57

Bldg 657N well C-16 Day 4

07:45

KA Geo (Alb) onsite. Layne set up
 & ready to go. Started drilling from 330 ft

0825

Sampled @ 335 & 340 w/ wireline
 0% recovery Had cemented silty gravels
 No indications of water

@ 343 drilling a little easier, silty matrix
 moist. Driller breaks water soon

@ 346 free water encountered.

Drilled to 350. Let rig sit for 15 min
 tagged water in dual-casing @ 343 ft

11:00

Drilled to 360. Blaine report that rig is
 having difficulty getting cuttings lifted out

Tagged hole 2 ft at shaft.

Carl & Blaine decide to ~~go~~ go to 362
 & clean out hole for sample (drill)

Collected cuttings from 355 to 365 ft for geotechnical
 TD @ 365 @ 11:45 hrs

11:45-

Clean out hole by flushing w/ clean
 water

12:15

Pull off top 10 ft of casing

~~12:30~~ 12:30

-1380 Driller took lunch while water level (w.c.) in
 hole is stabilizing

13:40

Tagged w.c. @ 342.8 @ 95

13:45

Started well Construction. Screen 340 to 360

Drillers wearing clean nitric gloves to set well casing
 bottom of casing @ \approx 360

0.020 slot screen: H = 20 ft

Block Casings:

~~TTTTT~~ TTTT TTTT
 TTTT TTTT TTTT
 TTTT III

Drillers taking care to keep well casing clean

14:45

Well Casing Set Suspended until
filter pack placed

Filter pack (Colorado Silica # 70/12/40

Placed 4 sacks, then raise dual-casing 5 ft

15:13

Raising 10 ft of dual-casing, bottom now at

350 ft Placed 2 more sacks & raise

Bentonite Seal

3 buckets

70 Seal
(1 sack)

Colorado Silica

12/40

(11 sacks)

326.4

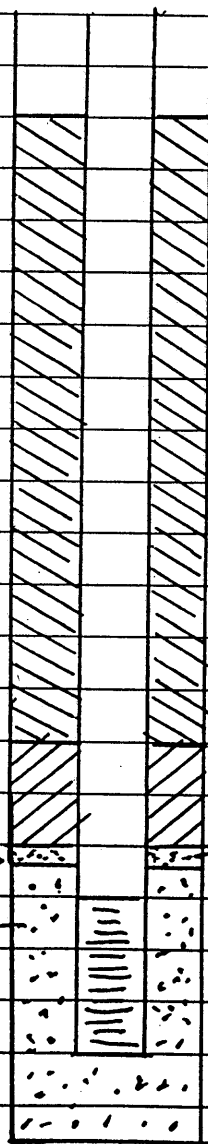
334 ✓

336.5 (Fig.)

340 ✓

360 ✓

365 ✓



5th
well #3

101

1523

Placed 3 more sacks ; pulled 10 ft
of drill casing, bottom now at 340 ft
Total = 9 sacks

15:45

Drillers went to jet water from
well #3 Pull up 4 ft

Sand Tagged @ 338.2

Add one more sack tagged deeper - possible bridge
Add one more sack for total of 11
tagged at 336.5

16:30

Placed Bentonite seal 3 Buckets

KA. Geo went to Salt Lake to drop off
Soil samples @ office

Carl Cole stayed to supervise

17:00

Blaine reportedly tagged top of bentonite

Total footage tag today:

~~330 to 3~~ 330 to 365 = 35 ft

Soil samples collected

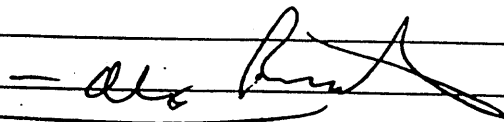
U3 SP04 1801 - packed cuttings

345 ft

U3 SP04 1802 - drive sampler

~~345 ft~~ 350 ft

Visitors: Carl Cole

- 

102

4/19/77

Driller reported that last night they placed 3 buckets of fine-release bentonite above filter pack under supervision of Carl Cole. Tagged 327.6

0740 Blaine tagged top of bentonite @ 326.4
Bottom of dual casing at 320 ft

0800 Health & Safety Meeting

Started placing bentonite grout seal

0832 Placed 10 sacks

1 sack / 35-gallon drum.

10:00 Placed 2 more sacks & pull dual-casing
Ttl. pulled 110 ft, bottom now @ 210
Placed 2 more sacks

10:20 Drillers used 1000 gal of water. Went to get more water from well house #3 to complete bentonite grout
Counted 18 sacks of bentonite used

11:30 Cleaned up site
Bent seal topped off using 9 more sacks, 27 total

11:30- Pulling dual-casing

15:00

13:00

60 ft of dual-casing still in hole
Driller topping off bentonite ~~seal~~ grout

APPENDIX C

- **LABORATORY ANALYTICAL REPORTS**
 - **CHAINS-OF-CUSTODY**
 - **COOLER RECEIPT FORMS**
 - **SAMPLE TRACKING FORMS**

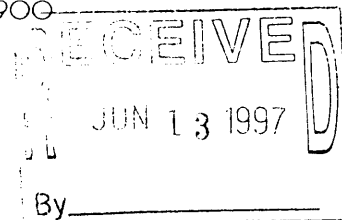


Curtis & Tompkins, Ltd., Analytical Laboratories, Since 1878

2323 Fifth Street, Berkeley, CA 94710, Phone (510) 486-0900

COVER PAGE

Laboratory Number 129292



Kleinfelder
2749 E. Parley's Way
Suite 100
Salt Lake City, UT 84109

Project#: 23-900026
Location: Tead Lust Sites

Sample ID	Lab ID
U3WP0512-01	129292-001
U3WP0512-02	129292-002
U3WP0512-03	129292-003
U3WP0512-04	129292-004
U1WP0513-01	129292-005
U1WP0513-02	129292-006

I certify that this data package has been reviewed for technical correctness and completeness. Please see attached narrative for a discussion of any analytical problems related to this sample set. Release of this data has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signatures.

Signature: Teresa Morrison for TG
Title: Operations Manager

Date: 6/11/97

Signature: [Signature]
Title: Project Manager

Date: 6/11/97

Laboratory Number: **129292**
Client: **Kleinfelder**
Project#: **23-900026**
Location: **TEAD Lust**

Receipt Date:  6/14/97 Curtis & Tompkins, Ltd.

CASE NARRATIVE

This hardcopy data package contains sample results and batch QC for six water samples which were received from the above referenced project on May 15, 1997. All samples were received cold and intact.

VOCs (EPA 8260): No analytical problems were encountered.

SVOCs (EPA 8270): No analytical problems were encountered.

TPH/Extractable: Low diesel recovery was observed in the matrix spike duplicate of sample CT# 129267-007, possibly due to inhomogenities introduced during sample collection. The spiked sample was not from TEAD and the laboratory control sample passed acceptance criteria.

Cations (EPA 6010): The calcium and sodium recoveries for the spike of sample U3WP0512-04 (CT# 129292-004) are not meaningful, because the concentrations of each of these elements in the spiked sample is greater than four times the spiking level.

General Chemistry: These samples were analyzed for alkalinity, chloride, and sulfate. The chloride and sulfate analyses were subcontracted to Clayton Environmental Consultants.

WESTON Analytics Use Only

[illegible]



Curtis & Tompkins, Inc.

COOLER RECEIPT CHECKLIST

Login#: 128282 Date Received: 5/15 Number of Coolers: 1
Client: Klein SLL Project: Klein SLL

A. Preliminary Examination Phase

Date Opened: 5/13 By (print): J. Williams (sign): [Signature]

1. Did cooler come with a shipping slip (airbill, etc.)? YES NO
If YES, enter carrier name and airbill number: Fed Ex 3873111373
2. Were custody seals on outside of cooler? YES NO
How many and where? 1 front Seal date: 5/14 Seal name: _____
3. Were custody seals unbroken and intact at the date and time of arrival? YES NO
4. Were custody papers dry and intact when received? YES NO
5. Were custody papers filled out properly (ink, signed, etc.)? YES NO
6. Did you sign the custody papers in the appropriate place? YES NO
7. Was project identifiable from custody papers? YES NO
If YES, enter project name at the top of this form.
8. If required, was sufficient ice used? YES NO
Type of ice: Cube Temperature: 5.0°C

B. Login Phase

Date Logged In: 5/15 By (print): J. Williams (sign): [Signature]

1. Describe type of packing in cooler: bubble wrap / insufficient Packing materials
2. Did all bottles arrive unbroken? YES NO dw 5/15/97
3. Were labels in good condition and complete (ID, date, time, signature, etc.)? YES NO
4. Did bottle labels agree with custody papers? YES NO
5. Were appropriate containers used for the tests indicated? YES NO
6. Were correct preservatives added to samples? YES NO
7. Was sufficient amount of sample sent for tests indicated? YES NO
8. Were bubbles absent in VOA samples? If NO, list sample IDs below YES NO
9. Was the client contacted concerning this sample delivery? YES NO
If YES, give details below
Who was called? _____ By whom? _____ Date: _____

Additional Comments:

CUSTODY SEAL

Date: 5/14/97

Signature: [Signature]



Volatile Organics by GC/MS

Client: Kleinfelder
Project#: 23-900026
Location: Tead Lust Sites

Analysis Method: EPA 8260
Prep Method: EPA 5030

Field ID: U3WP0512-01
Lab ID: 129292-001
Matrix: Water
Batch#: 34091
Units: ug/L
Diln Fac: 1

Sampled: 05/12/97
Received: 05/15/97
Extracted: 05/22/97
Analyzed: 05/22/97

Analyte	Result	Reporting Limit
Chloromethane	ND	10
Bromomethane	ND	10
Vinyl Chloride	ND	10
Chloroethane	ND	10
Methylene Chloride	ND	10
Acetone	ND	50
Carbon Disulfide	ND	50
Trichlorofluoromethane	ND	5.0
1,1-Dichloroethene	ND	5.0
1,1-Dichloroethane	ND	5.0
trans-1,2-Dichloroethene	ND	5.0
cis-1,2-Dichloroethene	ND	5.0
Chloroform	4.0 J	5.0
1,2-Dichloroethane	15	5.0
2-Butanone	ND	50
1,1,1-Trichloroethane	ND	5.0
Carbon Tetrachloride	ND	5.0
Vinyl Acetate	ND	50
Bromodichloromethane	ND	5.0
Dibromomethane	ND	5.0
1,2-Dichloropropane	ND	5.0
cis-1,3-Dichloropropene	ND	5.0
Trichloroethene	ND	5.0
Dibromochloromethane	ND	50
1,1,2-Trichloroethane	ND	5.0
Benzene	ND	5.0
trans-1,3-Dichloropropene	ND	5.0
Bromoform	ND	5.0
2-Hexanone	ND	50
4-Methyl-2-Pentanone	ND	50
1,1,2,2-Tetrachloroethane	ND	5.0
Tetrachloroethene	ND	5.0
Toluene	ND	5.0
Chlorobenzene	ND	5.0
Ethylbenzene	ND	5.0
Styrene	ND	5.0
m,p-Xylenes	ND	5.0



Volatile Organics by GC/MS

Field ID: U3WP0512-01
Lab ID: 129292-001
Matrix: Water
Batch#: 34091
Units: ug/L
Diln Fac: 1

Sampled: 05/12/97
Received: 05/15/97
Extracted: 05/22/97
Analyzed: 05/22/97

Analyte	Result	Reporting Limit
o-Xylene	ND	5.0
1,2,3-Trichloropropane	ND	5.0
1,3-Dichlorobenzene	ND	5.0
1,4-Dichlorobenzene	ND	5.0
1,2-Dichlorobenzene	ND	5.0
Naphthalene	ND	10

Surrogate	%Recovery	Recovery Limits
1,2-Dichloroethane-d4	106	68-126
Toluene-d8	102	88-110
Bromofluorobenzene	102	86-115

J: Estimated Value



Volatile Organics by GC/MS

Client: Kleinfelder
Project#: 23-900026
Location: TEAD Lust Sites

Analysis Method: EPA 8260
Prep Method: EPA 5030

Field ID: U1WP0513-01
Lab ID: 129292-005
Matrix: Water
Batch#: 34121
Units: ug/L
Diln Fac: 4.17

Sampled: 05/13/97
Received: 05/15/97
Extracted: 05/24/97
Analyzed: 05/24/97

Analyte	Result	Reporting Limit
Chloromethane	ND	42
Bromomethane	ND	42
Vinyl Chloride	ND	42
Chloroethane	ND	42
Methylene Chloride	ND	42
Acetone	ND	210
Carbon Disulfide	ND	210
Trichlorofluoromethane	ND	21
1,1-Dichloroethene	ND	21
1,1-Dichloroethane	ND	21
trans-1,2-Dichloroethene	ND	21
cis-1,2-Dichloroethene	ND	21
Chloroform	15 J	21
1,2-Dichloroethane	170	21
2-Butanone	ND	210
1,1,1-Trichloroethane	ND	21
Carbon Tetrachloride	ND	21
Vinyl Acetate	ND	210
Bromodichloromethane	ND	21
Dibromomethane	ND	21
1,2-Dichloropropane	ND	21
cis-1,3-Dichloropropene	ND	21
Trichloroethene	ND	21
Dibromochloromethane	ND	210
1,1,2-Trichloroethane	ND	21
Benzene	690	21
trans-1,3-Dichloropropene	ND	21
Bromoform	ND	21
2-Hexanone	ND	210
4-Methyl-2-Pentanone	ND	210
1,1,2,2-Tetrachloroethane	ND	21
Tetrachloroethene	ND	21
Toluene	ND	21
Chlorobenzene	ND	21
Ethylbenzene	ND	21
Styrene	ND	21
m,p-Xylenes	65	21



Volatile Organics by GC/MS

Field ID: U1WP0513-01

Lab ID: 129292-005

Matrix: Water

Batch#: 34121

Units: ug/L

Diln Fac: 4.17

Sampled: 05/13/97

Received: 05/15/97

Extracted: 05/24/97

Analyzed: 05/24/97

Analyte	Result	Reporting Limit
o-Xylene	ND	21
1,2,3-Trichloropropane	ND	21
1,3-Dichlorobenzene	ND	21
1,4-Dichlorobenzene	ND	21
1,2-Dichlorobenzene	ND	21
Naphthalene	ND	42

Surrogate	%Recovery	Recovery Limits
1,2-Dichloroethane-d4	102	68-126
Toluene-d8	101	88-110
Bromofluorobenzene	100	86-115

J: Estimated Value



Lab #: 129292

BATCH QC REPORT

Page 1 of 2

EPA 8260 Volatile Organics

Client: Kleinfelder
Project#: 23-900026
Location: Tead Lust Sites

Analysis Method: EPA 8260
Prep Method: EPA 5030

METHOD BLANK

Matrix: Water
Batch#: 34091
Units: ug/L
Diln Fac: 1

Prep Date: 05/22/97
Analysis Date: 05/22/97

MB Lab ID: QC46590

Analyte	Result	Reporting Limit
Chloromethane	ND	10
Bromomethane	ND	10
Vinyl Chloride	ND	10
Chloroethane	ND	10
Methylene Chloride	ND	10
Acetone	ND	10
Carbon Disulfide	ND	50
Trichlorofluoromethane	ND	50
1,1-Dichloroethene	ND	5.0
1,1-Dichloroethane	ND	5.0
trans-1,2-Dichloroethene	ND	5.0
cis-1,2-Dichloroethene	ND	5.0
Chloroform	ND	5.0
1,2-Dichloroethane	ND	5.0
2-Butanone	ND	5.0
1,1,1-Trichloroethane	ND	50
Carbon Tetrachloride	ND	5.0
Vinyl Acetate	ND	5.0
Bromodichloromethane	ND	50
Dibromomethane	ND	5.0
1,2-Dichloropropane	ND	5.0
cis-1,3-Dichloropropene	ND	5.0
Trichloroethene	ND	5.0
Dibromochloromethane	ND	5.0
1,1,2-Trichloroethane	ND	50
Benzene	ND	5.0
trans-1,3-Dichloropropene	ND	5.0
Bromoform	ND	5.0
2-Hexanone	ND	5.0
4-Methyl-2-Pentanone	ND	50
1,1,2,2-Tetrachloroethane	ND	50
Tetrachloroethene	ND	5.0
Toluene	ND	5.0
Chlorobenzene	ND	5.0
Ethylbenzene	ND	5.0
Styrene	ND	5.0
m,p-Xylenes	ND	5.0

Lab #: 129292

BATCH QC REPORT



Curtis & Tompkins, Ltd.

Page 2 of 2

EPA 8260 Volatile Organics

Client: Kleinfelder
Project#: 23-900026
Location: Tead Lust Sites

Analysis Method: EPA 8260
Prep Method: EPA 5030

METHOD BLANK

Matrix: Water
Batch#: 34091
Units: ug/L
Diln Fac: 1

Prep Date: 05/22/97
Analysis Date: 05/22/97

MB Lab ID: QC46590

Analyte	Result	Reporting Limit
o-Xylene	ND	
1,2,3-Trichloropropane	ND	5.0
1,3-Dichlorobenzene	ND	5.0
1,4-Dichlorobenzene	ND	5.0
1,2-Dichlorobenzene	ND	5.0
Naphthalene	ND	5.0
		10
Surrogate	%Rec	Recovery Limits
1,2-Dichloroethane-d4	107	
Toluene-d8	102	68-126
Bromofluorobenzene	104	88-110
		86-115

LR: Over linear range



Lab #: 129292

BATCH QC REPORT

Page 1 of 2

EPA 8260 Volatile Organics

Client: Kleinfelder
Project#: 23-900026
Location: Tead Lust Sites

Analysis Method: EPA 8260
Prep Method: EPA 5030

METHOD BLANK

Matrix: Water
Batch#: 34091
Units: ug/L
Diln Fac: 1

Prep Date: 05/22/97
Analysis Date: 05/22/97

MB Lab ID: QC46615

Analyte	Result	Reporting Limit
Chloromethane	ND	10
Bromomethane	ND	10
Vinyl Chloride	ND	10
Chloroethane	ND	10
Methylene Chloride	ND	10
Acetone	ND	10
Carbon Disulfide	ND	50
Trichlorofluoromethane	ND	50
1,1-Dichloroethene	ND	5.0
1,1-Dichloroethane	ND	5.0
trans-1,2-Dichloroethene	ND	5.0
cis-1,2-Dichloroethene	ND	5.0
Chloroform	ND	5.0
1,2-Dichloroethane	ND	5.0
2-Butanone	ND	5.0
1,1,1-Trichloroethane	ND	50
Carbon Tetrachloride	ND	5.0
Vinyl Acetate	ND	5.0
Bromodichloromethane	ND	50
Dibromomethane	ND	5.0
1,2-Dichloropropane	ND	5.0
cis-1,3-Dichloropropene	ND	5.0
Trichloroethene	ND	5.0
Dibromochloromethane	ND	5.0
1,1,2-Trichloroethane	ND	50
Benzene	ND	5.0
trans-1,3-Dichloropropene	ND	5.0
Bromoform	ND	5.0
2-Hexanone	ND	5.0
4-Methyl-2-Pentanone	ND	50
1,1,2,2-Tetrachloroethane	ND	50
Tetrachloroethene	ND	5.0
Toluene	ND	5.0
Chlorobenzene	ND	5.0
Ethylbenzene	ND	5.0
Styrene	ND	5.0
m,p-Xylenes	ND	5.0



Lab #: 129292

BATCH QC REPORT

Page 2 of 2

EPA 8260 Volatile Organics	
Client: Kleinfelder	Analysis Method: EPA 8260
Project#: 23-900026	Prep Method: EPA 5030
Location: Tead Lust Sites	
METHOD BLANK	
Matrix: Water	Prep Date: 05/22/97
Batch#: 34091	Analysis Date: 05/22/97
Units: ug/L	
Diln Fac: 1	

MB Lab ID: QC46615

Analyte	Result	Reporting Limit
o-Xylene	ND	5.0
1,2,3-Trichloropropane	ND	5.0
1,3-Dichlorobenzene	ND	5.0
1,4-Dichlorobenzene	ND	5.0
1,2-Dichlorobenzene	ND	5.0
Naphthalene	ND	10
Surrogate	%Rec	Recovery Limits
1,2-Dichloroethane-d4	104	68-126
Toluene-d8	101	88-110
Bromofluorobenzene	102	86-115

LR: Over linear range

Lab #: 129292

BATCH QC REPORT



Curtis & Tompkins, Ltd.

Page 1 of 2

EPA 8260 Volatile Organics

Client: Kleinfelder
Project#: 23-900026
Location: Tead Lust Sites

Analysis Method: EPA 8260
Prep Method: EPA 5030

METHOD BLANK

Matrix: Water
Batch#: 34121
Units: ug/L
Diln Fac: 1

Prep Date: 05/23/97
Analysis Date: 05/23/97

MB Lab ID: QC46706

Analyte	Result	Reporting Limit
Chloromethane	ND	10
Bromomethane	ND	10
Vinyl Chloride	ND	10
Chloroethane	ND	10
Methylene Chloride	ND	10
Acetone	ND	50
Carbon Disulfide	ND	50
Trichlorofluoromethane	ND	5.0
1,1-Dichloroethene	ND	5.0
1,1-Dichloroethane	ND	5.0
trans-1,2-Dichloroethene	ND	5.0
cis-1,2-Dichloroethene	ND	5.0
Chloroform	ND	5.0
1,2-Dichloroethane	ND	5.0
2-Butanone	ND	50
1,1,1-Trichloroethane	ND	5.0
Carbon Tetrachloride	ND	5.0
Vinyl Acetate	ND	50
Bromodichloromethane	ND	5.0
Dibromomethane	ND	5.0
1,2-Dichloropropane	ND	5.0
cis-1,3-Dichloropropene	ND	5.0
Trichloroethene	ND	5.0
Dibromochloromethane	ND	50
1,1,2-Trichloroethane	ND	5.0
Benzene	ND	5.0
trans-1,3-Dichloropropene	ND	5.0
Bromoform	ND	5.0
2-Hexanone	ND	50
4-Methyl-2-Pentanone	ND	50
1,1,2,2-Tetrachloroethane	ND	5.0
Tetrachloroethene	ND	5.0
Toluene	ND	5.0
Chlorobenzene	ND	5.0
Ethylbenzene	ND	5.0
Styrene	ND	5.0
m,p-Xylenes	ND	5.0

Lab #: 129292

BATCH QC REPORT



Curtis & Tompkins, Ltd.

Page 2 of 2

EPA 8260 Volatile Organics

Client: Kleinfelder
Project#: 23-900026
Location: Tead Lust Sites

Analysis Method: EPA 8260
Prep Method: EPA 5030

METHOD BLANK

Matrix: Water
Batch#: 34121
Units: ug/L
Diln Fac: 1

Prep Date: 05/23/97
Analysis Date: 05/23/97

MB Lab ID: QC46706

Analyte	Result	Reporting Limit
o-Xylene	ND	5.0
1,2,3-Trichloropropane	ND	5.0
1,3-Dichlorobenzene	ND	5.0
1,4-Dichlorobenzene	ND	5.0
1,2-Dichlorobenzene	ND	5.0
Naphthalene	ND	5.0
		10
Surrogate	%Rec	Recovery Limits
1,2-Dichloroethane-d4	101	68-126
Toluene-d8	100	88-110
Bromofluorobenzene	102	86-115

LR: Over linear range



Lab #: 129292

BATCH QC REPORT

Page 1 of 2

EPA 8260 Volatile Organics

Client: Kleinfelder
Project#: 23-900026
Location: Tead Lust Sites

Analysis Method: EPA 8260
Prep Method: EPA 5030

METHOD BLANK

Matrix: Water
Batch#: 34121
Units: ug/L
Diln Fac: 1

Prep Date: 05/23/97
Analysis Date: 05/23/97

MB Lab ID: QC46714

Analyte	Result	Reporting Limit
Chloromethane	ND	10
Bromomethane	ND	10
Vinyl Chloride	ND	10
Chloroethane	ND	10
Methylene Chloride	ND	10
Acetone	ND	50
Carbon Disulfide	ND	50
Trichlorofluoromethane	ND	5.0
1,1-Dichloroethene	ND	5.0
1,1-Dichloroethane	ND	5.0
trans-1,2-Dichloroethene	ND	5.0
cis-1,2-Dichloroethene	ND	5.0
Chloroform	ND	5.0
1,2-Dichloroethane	ND	5.0
2-Butanone	ND	50
1,1,1-Trichloroethane	ND	5.0
Carbon Tetrachloride	ND	5.0
Vinyl Acetate	ND	50
Bromodichloromethane	ND	5.0
Dibromomethane	ND	5.0
1,2-Dichloropropane	ND	5.0
cis-1,3-Dichloropropene	ND	5.0
Trichloroethene	ND	5.0
Dibromochloromethane	ND	50
1,1,2-Trichloroethane	ND	5.0
Benzene	ND	5.0
trans-1,3-Dichloropropene	ND	5.0
Bromoform	ND	5.0
2-Hexanone	ND	50
4-Methyl-2-Pentanone	ND	50
1,1,2,2-Tetrachloroethane	ND	5.0
Tetrachloroethene	ND	5.0
Toluene	ND	5.0
Chlorobenzene	ND	5.0
Ethylbenzene	ND	5.0
Styrene	ND	5.0
m,p-Xylenes	ND	5.0

Lab #: 129292

BATCH QC REPORT



Curtis & Tompkins, Ltd.

Page 2 of 2

EPA 8260 Volatile Organics	
Client: Kleinfelder	Analysis Method: EPA 8260
Project#: 23-900026	Prep Method: EPA 5030
Location: Tead Lust Sites	
METHOD BLANK	
Matrix: Water	Prep Date: 05/23/97
Batch#: 34121	Analysis Date: 05/23/97
Units: ug/L	
Diln Fac: 1	

MB Lab ID: QC46714

Analyte	Result	Reporting Limit
o-Xylene	ND	5.0
1,2,3-Trichloropropane	ND	5.0
1,3-Dichlorobenzene	ND	5.0
1,4-Dichlorobenzene	ND	5.0
1,2-Dichlorobenzene	ND	5.0
Naphthalene	ND	10
Surrogate	%Rec	Recovery Limits
1,2-Dichloroethane-d4	100	68-126
Toluene-d8	101	88-110
Bromofluorobenzene	101	86-115

LR: Over linear range

Lab #: 129292

BATCH QC REPORT



Curtis & Tompkins, Ltd.

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EPA 8260 Volatile Organics

Client: Kleinfelder
Project#: 23-900026
Location: Tead Lust Sites

Analysis Method: EPA 8260
Prep Method: EPA 5030

LABORATORY CONTROL SAMPLE

Matrix: Soil
Batch#: 34091
Units: ug/L
Diln Fac: 1

Prep Date: 05/22/97
Analysis Date: 05/22/97

LCS Lab ID: QC46589

Analyte	Result	Spike Added	%Rec #	Limits
1,1-Dichloroethene	45.6	50	91	61-145
Trichloroethene	46.16	50	92	71-120
Benzene	50.18	50	100	76-127
Toluene	48	50	96	76-125
Chlorobenzene	46.71	50	93	75-130
Surrogate	%Rec	Limits		
1,2-Dichloroethane-d4	107	68-126		
Toluene-d8	102	88-110		
Bromofluorobenzene	102	86-115		

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

Spike Recovery: 0 out of 5 outside limits

Lab #: 129292

BATCH QC REPORT



Curtis & Tompkins, Ltd.

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EPA 8260 Volatile Organics	
Client: Kleinfelder	Analysis Method: EPA 8260
Project#: 23-900026	Prep Method: EPA 5030
Location: Tead Lust Sites	
LABORATORY CONTROL SAMPLE	
Matrix: Water	Prep Date: 05/23/97
Batch#: 34121	Analysis Date: 05/23/97
Units: ug/L	
Diln Fac: 1	

LCS Lab ID: QC46705

Analyte	Result	Spike Added	%Rec #	Limits
1,1-Dichloroethene	43.06	50	86	61-145
Trichloroethene	46.84	50	94	71-120
Benzene	51.37	50	103	76-127
Toluene	49.46	50	99	76-125
Chlorobenzene	47.98	50	96	75-130
Surrogate	%Rec	Limits		
1,2-Dichloroethane-d4	98	68-126		
Toluene-d8	101	88-110		
Bromofluorobenzene	101	86-115		

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

Spike Recovery: 0 out of 5 outside limits

Lab #: 129292

BATCH QC REPORT



Curtis & Tompkins, Ltd.

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EPA 8260 Volatile Organics

Client: Kleinfelder
 Project#: 23-900026
 Location: Tead Lust Sites

Analysis Method: EPA 8260
 Prep Method: EPA 5030

MATRIX SPIKE/MATRIX SPIKE DUPLICATE

Field ID: ZZZZZZ
 Lab ID: 129278-001
 Matrix: Soil
 Batch#: 34121
 Units: ug/Kg dry weight
 Diln Fac: 25

Sample Date: 05/13/97
 Received Date: 05/14/97
 Prep Date: 05/23/97
 Analysis Date: 05/23/97
 Moisture: 29%

MS Lab ID: QC46711

Analyte	Spike Added	Sample	MS	%Rec #	Limits
1,1-Dichloroethene	1761	<176.1	1332	76	61-145
Trichloroethene	1761	<176.1	1727	86	71-120
Benzene	1761	<176.1	1661	93	76-127
Toluene	1761	<176.1	1622	91	76-125
Chlorobenzene	1761	11.8	2542	90	75-130
Surrogate	%Rec	Limits			
1,2-Dichloroethane-d4	93	68-126			
Toluene-d8	99	88-110			
Bromofluorobenzene	103	86-115			

MSD Lab ID: QC46712

Analyte	Spike Added	MSD	%Rec #	Limits	RPD #	Limit
1,1-Dichloroethene	1761	1293	73	61-145	3	20
Trichloroethene	1761	1756	87	71-120	2	20
Benzene	1761	1700	95	76-127	2	20
Toluene	1761	1621	91	76-125	0	20
Chlorobenzene	1761	2545	90	75-130	0	20
Surrogate	%Rec	Limits				
1,2-Dichloroethane-d4	91	68-126				
Toluene-d8	99	88-110				
Bromofluorobenzene	103	86-115				

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

RPD: 0 out of 5 outside limits

Spike Recovery: 0 out of 10 outside limits

Lab #: 129292

BATCH QC REPORT



Curtis & Tompkins, Ltd.

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EPA 8260 Volatile Organics

Client: Kleinfelder
 Project#: 23-900026
 Location: Tead Lust Sites

Analysis Method: EPA 8260
 Prep Method: EPA 5030

MATRIX SPIKE/MATRIX SPIKE DUPLICATE

Field ID: ZZZZZZ
 Lab ID: 129272-002
 Matrix: Water
 Batch#: 34091
 Units: ug/L
 Diln Fac: 1

Sample Date: 05/13/97
 Received Date: 05/13/97
 Prep Date: 05/22/97
 Analysis Date: 05/22/97

MS Lab ID: QC46611

Analyte	Spike Added	Sample	MS	%Rec #	Limits
1,1-Dichloroethene	50	<5	44.63	88	61-145
Trichloroethene	50	<5	44.76	90	71-120
Benzene	50	2.391	50.33	96	76-127
Toluene	50	<5	46.29	93	76-125
Chlorobenzene	50	<5	45.4	91	75-130
Surrogate	%Rec	Limits			
1,2-Dichloroethane-d4	105	68-126			
Toluene-d8	100	88-110			
Bromofluorobenzene	104	86-115			

MSD Lab ID: QC46612

Analyte	Spike Added	MSD	%Rec #	Limits	RPD #	Limit
1,1-Dichloroethene	50	42.02	83	61-145	6	20
Trichloroethene	50	43.13	86	71-120	4	20
Benzene	50	49.11	93	76-127	2	20
Toluene	50	45.88	92	76-125	1	20
Chlorobenzene	50	44.88	90	75-130	1	20
Surrogate	%Rec	Limits				
1,2-Dichloroethane-d4	102	68-126				
Toluene-d8	100	88-110				
Bromofluorobenzene	103	86-115				

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

RPD: 0 out of 5 outside limits

Spike Recovery: 0 out of 10 outside limits

Lab #: 129292

BATCH QC REPORT



Curtis & Tompkins, Ltd.

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EPA 8270 Semi-Volatile Organics

Client: Kleinfelder
 Project#: 23-900026
 Location: Tead Lust Sites

Analysis Method: EPA 8270
 Prep Method: EPA 3520

METHOD BLANK

Matrix: Water
 Batch#: 34025
 Units: ug/L
 Diln Fac: 1

Prep Date: 05/19/97
 Analysis Date: 05/27/97

MB Lab ID: QC46308

Analyte	Result	Reporting Limit
Phenol	ND	10
2-Chlorophenol	ND	10
Benzyl alcohol	ND	10
2-Methylphenol	ND	10
4-Methylphenol	ND	10
2-Nitrophenol	ND	10
2,4-Dimethylphenol	ND	50
Benzoic acid	ND	10
2,4-Dichlorophenol	ND	50
4-Chloro-3-methylphenol	ND	10
2,4,6-Trichlorophenol	ND	10
2,4,5-Trichlorophenol	ND	10
2,4-Dinitrophenol	ND	50
4-Nitrophenol	ND	50
4,6-Dinitro-2-methylphenol	ND	50
Pentachlorophenol	ND	50
N-Nitrosodimethylamine	ND	10
Aniline	ND	10
bis(2-Chloroethyl) ether	ND	10
1,3-Dichlorobenzene	ND	10
1,4-Dichlorobenzene	ND	10
1,2-Dichlorobenzene	ND	10
bis(2-Chloroisopropyl) ether	ND	10
N-Nitroso-di-n-propylamine	ND	10
Hexachloroethane	ND	10
Nitrobenzene	ND	10
Isophorone	ND	10
bis(2-Chloroethoxy) methane	ND	10
1,2,4-Trichlorobenzene	ND	10
Naphthalene	ND	10
4-Chloroaniline	ND	10
Hexachlorobutadiene	ND	10
2-Methylnaphthalene	ND	10
Hexachlorocyclopentadiene	ND	10
2-Chloronaphthalene	ND	10
2-Nitroaniline	ND	10
Dimethylphthalate	ND	50
Acenaphthylene	ND	10
2,6-Dinitrotoluene	ND	10
3-Nitroaniline	ND	10

Lab #: 129292

BATCH QC REPORT

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EPA 8270 Semi-Volatile Organics		
Client: Kleinfelder	Analysis Method: EPA 8270	
Project#: 23-900026	Prep Method: EPA 3520	
Location: Tead Lust Sites		
METHOD BLANK		
Matrix: Water	Prep Date: 05/19/97	
Batch#: 34025	Analysis Date: 05/27/97	
Units: ug/L		
Diln Fac: 1		

MB Lab ID: QC46308

Analyte	Result	Reporting Limit
Acenaphthene	ND	10
Dibenzofuran	ND	10
2,4-Dinitrotoluene	ND	10
Diethylphthalate	ND	10
4-Chlorophenyl-phenylether	ND	10
Fluorene	ND	10
4-Nitroaniline	ND	10
N-Nitrosodiphenylamine	ND	50
Azobenzene	ND	10
4-Bromophenyl-phenylether	ND	10
Hexachlorobenzene	ND	10
Phenanthrene	ND	10
Anthracene	ND	10
Di-n-butylphthalate	ND	10
Fluoranthene	ND	10
Pyrene	ND	10
Butylbenzylphthalate	ND	10
3,3'-Dichlorobenzidine	ND	10
Benzo(a)anthracene	ND	50
Chrysene	ND	10
bis(2-Ethylhexyl)phthalate	ND	10
Di-n-octylphthalate	ND	10
Benzo(b)fluoranthene	ND	10
Benzo(k)fluoranthene	ND	10
Benzo(a)pyrene	ND	10
Indeno(1,2,3-cd)pyrene	ND	10
Dibenz(a,h)anthracene	ND	10
Benzo(g,h,i)perylene	ND	10
Surrogate	%Rec	Recovery Limits
2-Fluorophenol	51	21-110
Phenol-d5	55	10-110
2,4,6-Tribromophenol	53	10-123
Nitrobenzene-d5	72	35-114
2-Fluorobiphenyl	79	43-116
Terphenyl-d14	96	33-141



Semivolatile Organics by GC/MS

Client: Kleinfelder
Project#: 23-900026
Location: Tead Lust Sites

Analysis Method: EPA 8270
Prep Method: EPA 3520

Field ID: U3WP0512-02
Lab ID: 129292-002
Matrix: Water
Batch#: 34025
Units: ug/L
Diln Fac: 1

Sampled: 05/12/97
Received: 05/15/97
Extracted: 05/19/97
Analyzed: 05/27/97

Analyte	Result	Reporting Limit
Phenol	ND	9.4
2-Chlorophenol	ND	9.4
Benzyl alcohol	ND	9.4
2-Methylphenol	ND	9.4
4-Methylphenol	ND	9.4
2-Nitrophenol	ND	47
2,4-Dimethylphenol	ND	9.4
Benzoic acid	ND	47
2,4-Dichlorophenol	ND	9.4
4-Chloro-3-methylphenol	ND	9.4
2,4,6-Trichlorophenol	ND	9.4
2,4,5-Trichlorophenol	ND	47
2,4-Dinitrophenol	ND	47
4-Nitrophenol	ND	47
4,6-Dinitro-2-methylphenol	ND	47
Pentachlorophenol	ND	47
N-Nitrosodimethylamine	ND	9.4
Aniline	ND	9.4
bis(2-Chloroethyl) ether	ND	9.4
1,3-Dichlorobenzene	ND	9.4
1,4-Dichlorobenzene	ND	9.4
1,2-Dichlorobenzene	ND	9.4
bis(2-Chloroisopropyl) ether	ND	9.4
N-Nitroso-di-n-propylamine	ND	9.4
Hexachloroethane	ND	9.4
Nitrobenzene	ND	9.4
Isophorone	ND	9.4
bis(2-Chloroethoxy) methane	ND	9.4
1,2,4-Trichlorobenzene	ND	9.4
Naphthalene	ND	9.4
4-Chloroaniline	ND	9.4
Hexachlorobutadiene	ND	9.4
2-Methylnaphthalene	ND	9.4
Hexachlorocyclopentadiene	ND	9.4
2-Chloronaphthalene	ND	9.4
2-Nitroaniline	ND	47
Dimethylphthalate	ND	9.4
Acenaphthylene	ND	9.4



Semivolatile Organics by GC/MS

Field ID: U3WP0512-02

Lab ID: 129292-002

Matrix: Water

Batch#: 34025

Units: ug/L

Diln Fac: 1

Sampled: 05/12/97

Received: 05/15/97

Extracted: 05/19/97

Analyzed: 05/27/97

Analyte	Result	Reporting Limit
2,6-Dinitrotoluene	ND	9.4
3-Nitroaniline	ND	47
Acenaphthene	ND	9.4
Dibenzofuran	ND	9.4
2,4-Dinitrotoluene	ND	9.4
Diethylphthalate	ND	9.4
4-Chlorophenyl-phenylether	ND	9.4
Fluorene	ND	9.4
4-Nitroaniline	ND	9.4
N-Nitrosodiphenylamine	ND	47
Azobenzene	ND	9.4
4-Bromophenyl-phenylether	ND	9.4
Hexachlorobenzene	ND	9.4
Phenanthrene	ND	9.4
Anthracene	ND	9.4
Di-n-butylphthalate	ND	9.4
Fluoranthene	ND	9.4
Pyrene	ND	9.4
Butylbenzylphthalate	ND	9.4
3,3'-Dichlorobenzidine	ND	9.4
Benzo(a)anthracene	ND	47
Chrysene	ND	9.4
bis(2-Ethylhexyl)phthalate	ND	9.4
Di-n-octylphthalate	ND	9.4
Benzo(b)fluoranthene	ND	9.4
Benzo(k)fluoranthene	ND	9.4
Benzo(a)pyrene	ND	9.4
Indeno(1,2,3-cd)pyrene	ND	9.4
Dibenz(a,h)anthracene	ND	9.4
Benzo(g,h,i)perylene	ND	9.4
Surrogate	%Recovery	Recovery Limits
2-Fluorophenol	48	21-110
Phenol-d5	53	10-110
2,4,6-Tribromophenol	54	10-123
Nitrobenzene-d5	68	35-114
2-Fluorobiphenyl	74	43-116
Terphenyl-d14	81	33-141

Lab #: 129292

BATCH QC REPORT



Curtis & Tompkins, Ltd.

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EPA 8270 Semi-Volatile Organics

Client: Kleinfelder
 Project#: 23-900026
 Location: Tead Lust Sites

Analysis Method: EPA 8270
 Prep Method: EPA 3520

BLANK SPIKE/BLANK SPIKE DUPLICATE

Matrix: Water
 Batch#: 34025
 Units: ug/L
 Diln Fac: 1

Prep Date: 05/19/97
 Analysis Date: 05/27/97

BS Lab ID: QC46309

Analyte	Spike Added	BS	%Rec	#	Limits
Phenol	100	61.01	61		12-110
2-Chlorophenol	100	64.75	65		27-123
4-Chloro-3-methylphenol	100	61.78	62		23-97
4-Nitrophenol	100	36.03	36		10-80
Pentachlorophenol	100	37.67	38		9-103
1,4-Dichlorobenzene	50	32.16	64		36-97
N-Nitroso-di-n-propylamine	50	30.15	60		41-116
1,2,4-Trichlorobenzene	50	34.39	69		39-98
Acenaphthene	50	35.94	72		46-118
2,4-Dinitrotoluene	50	28.79	58		24-96
Pyrene	50	38.36	77		26-127
Surrogate	%Rec	Limits			
2-Fluorophenol	53	21-110			
Phenol-d5	56	10-110			
2,4,6-Tribromophenol	57	10-123			
Nitrobenzene-d5	73	35-114			
2-Fluorobiphenyl	75	43-116			
Terphenyl-d14	86	33-141			

BSD Lab ID: QC46310

Analyte	Spike Added	BSD	%Rec	#	Limits	RPD #	Limit
Phenol	100	71.44	71		12-110	15	42
2-Chlorophenol	100	74.52	75		27-123	14	40
4-Chloro-3-methylphenol	100	73.29	73		23-97	16	42
4-Nitrophenol	100	51.12	51		10-80	34	50
Pentachlorophenol	100	31.71	32		9-103	17	50
1,4-Dichlorobenzene	50	35.59	71		36-97	10	28
N-Nitroso-di-n-propylamine	50	33.38	67		41-116	11	38
1,2,4-Trichlorobenzene	50	38.36	77		39-98	11	28
Acenaphthene	50	41.3	83		46-118	14	31
2,4-Dinitrotoluene	50	33.6	67		24-96	14	38
Pyrene	50	44.8	90		26-127	16	31
Surrogate	%Rec	Limits					
2-Fluorophenol	59	21-110					
Phenol-d5	64	10-110					
2,4,6-Tribromophenol	68	10-123					
Nitrobenzene-d5	83	35-114					
2-Fluorobiphenyl	85	43-116					
Terphenyl-d14	99	33-141					

Column to be used to flag recovery and RPD values with an asterisk
 * Values outside of QC limits
 RPD: 0 out of 11 outside limits
 Spike Recovery: 0 out of 22 outside limits

TEH-Tot Ext Hydrocarbons

Client: Kleinfelder
Project#: 23-900026
Location: TEAD Lust Sites

Analysis Method: CA LUFT (EPA 8015M)
Prep Method: EPA 3520

Sample #	Client ID	Batch #	Sampled	Extracted	Analyzed	Moisture
129292-003	U3WP0512-03	34034	05/12/97	05/19/97	05/21/97	
129292-006	U1WP0513-02	34034	05/13/97	05/19/97	05/21/97	

Matrix: Water

Analyte	Units	129292-003	129292-006
Diln Fac:		1	1
Kerosene C10-C16	ug/L	<250	690
Diesel C12-C22	ug/L	<250	430 YL
Surrogate			
Hexacosane	%REC	95	89

Y: Sample exhibits fuel pattern which does not resemble standard
L: Lighter hydrocarbons than indicated standard

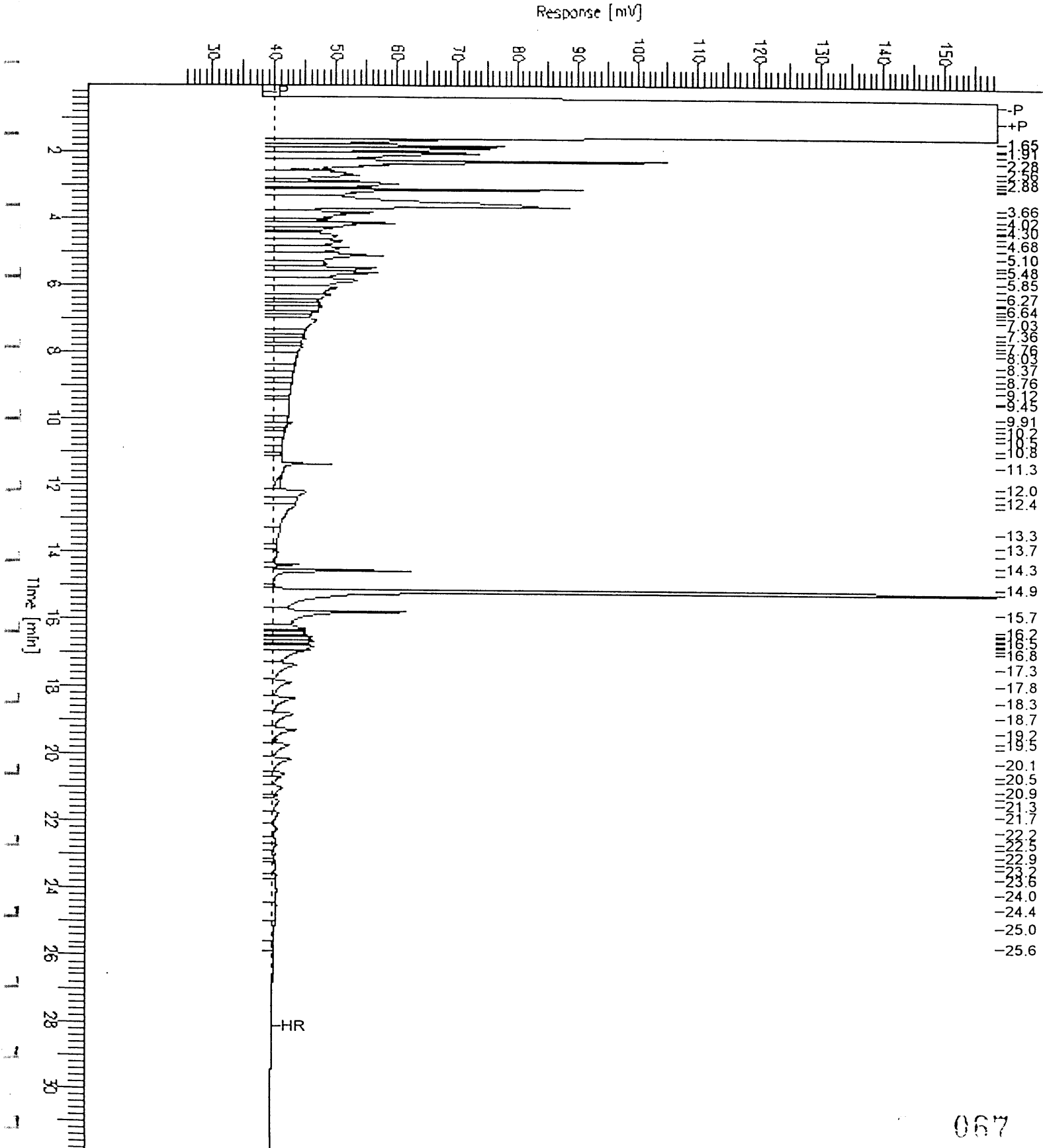
GC15 Channel B TEH

Sample Name : 129292-006,34034
 FileName : G:\GC15\CHB\140B014.RAW
 Method : B140TEH.MTH
 Start Time : 0.01 min
 Scale Factor: 0.0

End Time : 31.91 min
 Plot Offset: 25 mV

Sample #: 34034
 Date : 5/21/97 01:34 PM
 Time of Injection: 5/21/97 03:24 AM
 Low Point : 25.08 mV
 High Point : 158.71 mV
 Plot Scale: 133.6 mV

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Lab #: 129292

BATCH QC REPORT



Curtis & Tompkins, Ltd.

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TEH-Tot Ext Hydrocarbons

Client: Kleinfelder
Project#: 23-900026
Location: Tead Lust Sites

Analysis Method: CA LUFT (EPA 8015M)
Prep Method: EPA 3520

METHOD BLANK

Matrix: Water
Batch#: 34034
Units: ug/L
Diln Fac: 1

Prep Date: 05/19/97
Analysis Date: 05/20/97

MB Lab ID: QC46342

Analyte	Result	
Kerosene C10-C16	<250	
Diesel C12-C22	<250	
Surrogate	%Rec	Recovery Limits
Hexacosane	84	65-135



Lab #: 129292

BATCH QC REPORT

TEH-Tot Ext Hydrocarbons

Client: Kleinfelder
Project#: 23-900026
Location: Tead Lust Sites

Analysis Method: CA LUFT (EPA 8015M)
Prep Method: EPA 3520

LABORATORY CONTROL SAMPLE

Matrix: Water
Batch#: 34034
Units: ug/L
Diln Fac: 1

Prep Date: 05/19/97
Analysis Date: 05/20/97

LCS Lab ID: QC46343

Analyte	Result	Spike Added	%Rec #	Limits
Diesel C12-C22	1647	2475	67	65-135
Surrogate	%Rec	Limits		
Hexacosane	79	65-135		

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

Spike Recovery: 0 out of 1 outside limits

Lab #: 129292

BATCH QC REPORT



Curtis & Tompkins, Ltd.

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TEH-Tot Ext Hydrocarbons	
Client: Kleinfelder	Analysis Method: CA LUFT (EPA 8015M)
Project#: 23-900026	Prep Method: EPA 3520
Location: Tead Lust Sites	
MATRIX SPIKE/MATRIX SPIKE DUPLICATE	
Field ID: ZZZZZZ	Sample Date: 05/13/97
Lab ID: 129267-007	Received Date: 05/13/97
Matrix: Water	Prep Date: 05/19/97
Batch#: 34034	Analysis Date: 05/21/97
Units: ug/L	
Diln Fac: 1	

MS Lab ID: QC46344

Analyte	Spike Added	Sample	MS	%Rec #	Limits
Diesel C12-C22	2475	1320	3239	78	65-135
Surrogate	%Rec	Limits			
Hexacosane	90	65-135			

MSD Lab ID: QC46345

Analyte	Spike Added	MSD	%Rec #	Limits	RPD #	Limit
Diesel C12-C22	2475	2497	48 *	65-135	26 *	20
Surrogate	%Rec	Limits				
Hexacosane	79	65-135				

Column to be used to flag recovery and RPD values with an asterisk
 * Values outside of QC limits
 RPD: 1 out of 1 outside limits
 Spike Recovery: 1 out of 2 outside limits



Curtis & Tompkins, Ltd.

SAMPLE ID: U3WP0512-04
LAB ID: 129292-004
CLIENT: Kleinfelder
PROJECT ID: 23-900026
LOCATION: TEAD Lust Sites
MATRIX: Water

DATE SAMPLED: 05/12/97
DATE RECEIVED: 05/15/97
DATE REPORTED: 05/29/97

Metals Analytical Report

Compound	Result (ug/L)	Reporting Limit (ug/L)	IDF	QC Batch	Method	Analysis Date
Calcium	130000	500	1	34106	EPA 6010A	05/27/97
Magnesium	57000	500	1	34106	EPA 6010A	05/27/97
Potassium	4100	500	1	34106	EPA 6010A	05/27/97
Sodium	160000	500	1	34106	EPA 6010A	05/27/97



Curtis & Tompkins, Ltd.

CLIENT: Kleinfelder
JOB NUMBER: 129292

DATE REPORTED: 05/29/97

BATCH QC REPORT
PREP BLANK

Compound	Result	Reporting Limit	Units	IDF	QC Batch	Method	Analysis Date
Calcium	ND	500	ug/L	1	34106	EPA 6010A	05/27/97
Magnesium	ND	500	ug/L	1	34106	EPA 6010A	05/27/97
Potassium	ND	500	ug/L	1	34106	EPA 6010A	05/27/97
Sodium	ND	500	ug/L	1	34106	EPA 6010A	05/27/97

ND = Not Detected at or above reporting limit

CLIENT: Kleinfelder
JOB NUMBER: 129292

DATE REPORTED: 05/29/97

BATCH QC REPORT
BLANK SPIKE / BLANK SPIKE DUPLICATE

Compound	Spike Amount	BS Result	BSD Result	Units	BS% Rec.	BSD% Rec.	Rec. Limits	RPD %	RPD Limit	QC Batch	Method	Analysis Date
Calcium	20000	22120	21240	ug/L	111	106	80-120	4	35	34106	EPA 6010A	05/28/97
Magnesium	20000	22650	21920	ug/L	113	110	80-120	3	35	34106	EPA 6010A	05/28/97
Potassium	20000	19740	19250	ug/L	99	96	80-120	3	35	34106	EPA 6010A	05/27/97
Sodium	20000	20290	19970	ug/L	102	100	80-120	2	35	34106	EPA 6010A	05/27/97

CLIENT: Kleinfelder
JOB NUMBER: 129292

DATE REPORTED: 05/29/97

BATCH QC REPORT
SAMPLE DUPLICATE

Compound	Sample	Sample Result	Duplicate Result	Units	RPD %	RPD Limit	QC Batch	Method	Analysis Date
Calcium	129292-004	130000	131600	ug/L	1	20	34106	EPA 6010A	05/27/97
Magnesium	129292-004	57300	57730	ug/L	1	20	34106	EPA 6010A	05/27/97
Potassium	129292-004	4073	4252	ug/L	4	20	34106	EPA 6010A	05/27/97
Sodium	129292-004	159900	158900	ug/L	1	20	34106	EPA 6010A	05/27/97



Curtis & Tompkins, Ltd.

CLIENT: Kleinfelder
JOB NUMBER: 129292

DATE REPORTED: 05/29/97

BATCH QC REPORT
SAMPLE SPIKE

Compound	Spike Amount	Sample	Sample Result	Spike Result	Units	Percent Rec.	Rec. Limit	QC Batch	Method	Analysis Date
Calcium	20000	129292-004	130000	147200	ug/L	86 NM	65-135	34106	EPA 6010A	05/27/97
Magnesium	20000	129292-004	57300	78510	ug/L	106	65-135	34106	EPA 6010A	05/27/97
Potassium	20000	129292-004	4073	24940	ug/L	104	65-135	34106	EPA 6010A	05/27/97
Sodium	20000	129292-004	159900	180200	ug/L	102 NM	65-135	34106	EPA 6010A	05/27/97

NM = Not Meaningful

San Francisco Regional Office

1252 Quarry Lane
P.O. Box 9019
Pleasanton, CA 94566
(510) 426-2600
Fax (510) 426-0106

Clayton
ENVIRONMENTAL
CONSULTANTS

May 28, 1997

Mr. Anh Do
CURTIS & TOMPKINS, LTD.
2323 Fifth Street
Berkeley, CA 94710

Client Ref.: 129292
Clayton Project No.: 97052.66

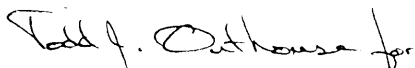
Dear Mr. Do:

Attached is our analytical laboratory report for the samples received on May 20, 1997. Following the cover letter is the Quality Control Narrative detailing sample information/problems and a summary of the quality control issues. Also enclosed is a copy of the Chain-of-Custody record acknowledging receipt of these samples.

Please note that any unused portion of the samples will be discarded after June 27, 1997, unless you have requested otherwise.

We appreciate the opportunity to assist you. If you have any questions concerning this report, please contact Suzanne Haus, Client Services Supervisor, at (510) 426-2657.

Sincerely,



Harriotte A. Hurley, CIH
Director, Laboratory Services
San Francisco Regional Office

HAH/seh

Attachments

Analytical Results
for
Curtis & Tompkins, Ltd.
Client Reference: 129292
Clayton Project No. 97052.66

Sample Identification: See Below
Lab Number: 9705266
Sample Matrix/Media: WATER
Method Reference: EPA 300.0

Date Received: 05/20/97
Date Analyzed: 05/21/97

Lab Number	Sample Identification	Date Sampled	Chloride (mg/L)	Method Detection Limit (mg/L)
01	U3WPO512-04	05/12/97	380	0.1
-02	METHOD BLANK	--	<0.1	0.1

ND: Not detected at or above limit of detection
-: Information not available or not applicable

Quality Assurance Results Summary - Matrix Spike/Matrix Spike Duplicate

Clayton Project No. 97052.66

Clayton Lab Number: 9705200-03C
 Ext./Prep. Method: -- / --
 Date: / /
 Analyst: --
 Std. Source: IC970414A
 Sample Matrix/Media: WATER

Analytical Method: EPA 300.0
 Instrument ID: 02739
 Date: 05/21/97
 Time: 14:43
 Analyst: HYW
 Units: mg/L
 QC Batch No: 9705212H

Analyte	Sample Result	Spike Level	Matrix Spike Result	MS Recovery (%)	Matrix Duplicate Result	MSD Recovery (%)	Average Recovery (% R)	LCL (% R)	UCL (% R)	RPD (%)	UCL (%RPD)
BROMIDE	16.3	500	559	109	550	107	108	92	120	1.6	20
CHLORIDE	537	2,000	2,390	93	2,370	92	92	79	108	0.8	20
FLUORIDE	4.60	1,000	975	97	973	97	97	86	106	0.2	20
NITRATE AS NITROGEN	0.290	1,000	910	91	905	90	91	77	103	0.6	20
NITRITE	ND	500	505	101	501	100	101	81	109	0.8	20
PHOSPHATE	0.270	2,000	1,740	87	1,750	87	87	61	119	0.4	20
SULFATE	77.3	4,000	3,610	88	3,590	88	88	74	109	0.4	20

ND = Not detected at or above limit of detection
 MSOR = Spike out of range due to high sample concentration.

LCL = Lower Control Limit

UCL = Upper Control Limit

Analytical Results
for
Curtis & Tompkins, Ltd.
Client Reference: 129292
Clayton Project No. 97052.66

Sample Identification: See Below
Lab Number: 9705266
Sample Matrix/Media: WATER
Method Reference: EPA 300.0

Date Received: 05/20/97
Date Analyzed: 05/21/97

Lab Number	Sample Identification	Date Sampled	Sulfate (mg/L)	Method Detection Limit (mg/L)
-01	U3WPO512-04	05/12/97	120	0.1
-02	METHOD BLANK	--	<0.1	0.1

ND: Not detected at or above limit of detection
--: Information not available or not applicable

QUALITY CONTROL NARRATIVE
for
Curtis & Tompkins, LTD.
Client Reference: 129292
Clayton Project No. 97052.66

Sample Information/Problems:

There were no problems encountered with sample receipt.

Analytical Information/Problems:

There were no problems encountered with the sample analyses.

Quality Control:

The quality control data is summarized in the Quality Assurance Data Package, which follows the analytical report.

- MS/MSD: A matrix spike and matrix spike duplicate were analyzed where applicable, and all results were acceptable.
- CCV: Response for all analytes met Clayton acceptance criteria.
- Surrogate Recoveries: Not applicable.



Curtis & Tompkins, Ltd., Analytical Laboratories, Since 1878
2323 Fifth Street, Berkeley, CA 94710. Phone (510) 486-0900

COVER PAGE

Laboratory Number 129460

Kleinfelder
2749 E. Parley's Way
Suite 100
Salt Lake City, UT 84109

Project#: 23-900026
Location: Tead Lust Sites

Sample ID	Lab ID
U3WP0512-01	129460-001
U1WP0513-01	129460-002

I certify that this data package has been reviewed for technical correctness and completeness. Please see attached narrative for a discussion of any analytical problems related to this sample set. Release of this data has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signatures.

Signature: Teresa K. Morrison for JG
Title: Operations Manager

Date: 6/11/97

Signature: [Signature]
Title: Project Manager

Date: 6/11/97

Laboratory Number: **129460**
Client: **Kleinfelder**
Project#: **23-900026**
Location: **TEAD Lust**

Request Date  06/09/97 Curtis & Tompkins, Ltd.

CASE NARRATIVE

This hardcopy data package contains sample results and batch QC for the additional TPH/gasoline analysis of two water samples which was requested on May 30, 1997.

A single-point calibration is used for tri-fluorotoluene and bromobenze because these surrogates are always added to the sample, at the same level, by the autosampler. The surrogates are calibrated to 100%; sample surrogate recovery is calculated by dividing the sample response by the calibration standard response. No linear coefficient or RSD is involved.

No analytical problems were encountered.



TVH-Total Volatile Hydrocarbons

Client: Kleinfelder
Project#: 23-900026
Location: Tead Lust Sites

Analysis Method: CA LUFT (EPA 8015M)
Prep Method: EPA 5030

Sample #	Client ID	Batch #	Sampled	Extracted	Analyzed	Moisture
129460-001	U3WP0512-01	34221	05/12/97	05/31/97	05/31/97	
129460-002	U1WP0513-01	34221	05/13/97	05/31/97	05/31/97	

Matrix: Water

Analyte	Units	129460-001	129460-002
Diln Fac:		1	1
Gasoline	ug/L	<50	610
Surrogate			
Trifluorotoluene	%REC	86	86
Bromobenzene	%REC	87	94



Lab #: 129460

BATCH QC REPORT

Page 1 of 1

TVH-Total Volatile Hydrocarbons

Client: Kleinfelder
Project#: 23-900026
Location: Tead Lust Sites

Analysis Method: CA LUFT (EPA 8015M)
Prep Method: EPA 5030

METHOD BLANK

Matrix: Water
Batch#: 34221
Units: ug/L
Diln Fac: 1

Prep Date: 05/30/97
Analysis Date: 05/30/97

MB Lab ID: QC47126

Analyte	Result	
Gasoline	<50	
Surrogate	%Rec	Recovery Limits
Trifluorotoluene	84	69-120
Bromobenzene	85	65-135

Lab #: 129460

BATCH QC REPORT



Curtis & Tompkins, Ltd.

Page 1 of 1

TVH-Total Volatile Hydrocarbons

Client: Kleinfelder
Project#: 23-900026
Location: Tead Lust Sites

Analysis Method: CA LUFT (EPA 8015M)
Prep Method: EPA 5030

LABORATORY CONTROL SAMPLE

Matrix: Water
Batch#: 34221
Units: ug/L
Diln Fac: 1

Prep Date: 05/30/97
Analysis Date: 05/30/97

LCS Lab ID: QC47125

Analyte	Result	Spike Added	%Rec #	Limits
Gasoline	2065	2000	103	65-135
Surrogate	%Rec	Limits		
Trifluorotoluene	115	69-120		
Bromobenzene	99	65-135		

Column to be used to flag recovery and RPD values with an asterisk
* Values outside of QC limits
Spike Recovery: 0 out of 1 outside limits



Lab #: 129460

BATCH QC REPORT

Page 1 of 1

TVH-Total Volatile Hydrocarbons	
Client: Kleinfelder	Analysis Method: CA LUFT (EPA 8015M)
Project#: 23-900026	Prep Method: EPA 5030
Location: Tead Lust Sites	
MATRIX SPIKE/MATRIX SPIKE DUPLICATE	
Field ID: ZZZZZZ	Sample Date: 05/21/97
Lab ID: 129399-007	Received Date: 05/23/97
Matrix: Water	Prep Date: 05/30/97
Batch#: 34221	Analysis Date: 05/30/97
Units: ug/L	
Diln Fac: 1	

MS Lab ID: QC47127

Analyte	Spike Added	Sample	MS	%Rec #	Limits
Gasoline	2000	<50	1927	96	65-135
Surrogate	%Rec	Limits			
Trifluorotoluene	114	69-120			
Bromobenzene	101	65-135			

MSD Lab ID: QC47128

Analyte	Spike Added	MSD	%Rec #	Limits	RPD #	Limit
Gasoline	2000	1926	96	65-135	0	20
Surrogate	%Rec	Limits				
Trifluorotoluene	115	69-120				
Bromobenzene	101	65-135				

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

RPD: 0 out of 1 outside limits

Spike Recovery: 0 out of 2 outside limits



Curis & Tompkins, Ltd., Analytical Laboratories, Since 1878

2323 Fifth Street, Berkeley, CA 94710. Phone (510) 486-0900

JUN 20 1997

By _____

COVER PAGE

Laboratory Number 129063

Kleinfelder
2749 E. Parley's Way
Suite 100
Salt Lake City, UT 84109

Project#: 23-900026
Location: TEAD Lust Sites

Sample ID	Lab ID
U3SP041501	129063-001
U3W2041501	129063-002
U3SP041801	129063-003
U3SP041802	129063-004
U3SP041701	129063-005
U1SP-0421-02	129063-006
U1SP-0422-02	129063-007

I certify that this data package has been reviewed for technical correctness and completeness. Please see attached narrative for a discussion of any analytical problems related to this sample set. Release of this data has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signatures.

Signature: [Signature]
Title: Operations Manager or Director

Date: 5/30/97

Signature: [Signature]
Title: Project Manager

Date: 5/30/97

PROJ NO
A02

LP NO
(P.O. NO.)

DATE
MM DD YY

SAMPLE ID
TIME
HH MM SS

PROJECT NAME
637 SW

TEAD LUST, Add'l Cher.

SAMPLERS: (Signature/Number)

Daniel Horus / 2362

NO
OF
CON.
TAINERS

ANALYSIS

TPH (8260)

BTEX

% Heptane

REMARKS

Building 637 SW, WEN C-17

45 feet, 90% full tube, PID = 1.5

75 feet, 90% full tube, PID = 1.5

121 feet, 80% full tube, PID = 2.7

195 feet, 100% full tube, PID = 4.1

Trip Blank

PROJ NO
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MM DD YY

SAMPLE ID
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PROJECT NAME
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TEAD LUST, Add'l Cher.

SAMPLERS: (Signature/Number)

Daniel Horus / 2362

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OF
CON.
TAINERS

ANALYSIS

TPH (8260)

BTEX

% Heptane

REMARKS

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121 feet, 80% full tube, PID = 2.7

195 feet, 100% full tube, PID = 4.1

Trip Blank

Laboratory Number: 129063
Client: Kleinfelder
Project#: 23-900026
Location: TEAD LUST Sites

Sample Date: 04/15-22/97
Receipt Date: 04/24/97

CASE NARRATIVE

This hardcopy data package contains sample and batch QC results for two water and six soil samples received from the above referenced project. The samples were cold and intact. Soil results are reported on a dry-weight basis.

Semivolatile Organics (EPA 8270): High percent differences (%Ds) were observed for 2,4-dinitrophenol in the continuing calibration performed on May 5, 1997, analytical batch 33713. The high %Ds should not affect the quality of the data as the minimum response criterion for 2,4-dinitrophenol was met and 2,4-dinitrophenol was not detected in any of the associated samples. No other analytical problems were encountered.

TEAD



Curtis & Associates, Inc.

COOLER RECEIPT CHECKLIST

Login#: 129063 Date Received: 4/25 Number of Coolers: 1
 Client: Wain Sec Project: TEAD 637W

A. Preliminary Examination Phase

Date Opened: 4/25 By (print): J. Williams (sign): [Signature]

1. Did cooler come with a shipping slip (airbill, etc.)? YES NO
 If YES, enter carrier name and airbill number: Fed Ex 387311056
2. Were custody seals on outside of cooler? YES NO
 How many and where? 2 seals Seal date: 4/24 Seal name: _____
3. Were custody seals unbroken and intact at the date and time of arrival? YES NO
4. Were custody papers dry and intact when received? YES NO
5. Were custody papers filled out properly (ink, signed, etc.)? YES NO
6. Did you sign the custody papers in the appropriate place? YES NO
7. Was project identifiable from custody papers? YES NO
 If YES, enter project name at the top of this form.
8. If required, was sufficient ice used? YES NO
 Type of ice: cube Temperature: 4.0°C

B. Login Phase

Date Logged In: 4/25 By (print): J. Williams (sign): [Signature]

1. Describe type of packing in cooler: _____
2. Did all bottles arrive unbroken? YES NO
3. Were labels in good condition and complete (ID, date, time, signature, etc.)? YES NO
4. Did bottle labels agree with custody papers? YES NO
5. Were appropriate containers used for the tests indicated? YES NO
6. Were correct preservatives added to samples? YES NO
7. Was sufficient amount of sample sent for tests indicated? YES NO
8. Were bubbles absent in VOA samples? If NO, list sample IDs below YES NO
9. Was the client contacted concerning this sample delivery? YES NO
 If YES, give details below.

Who was called? _____ By whom? _____ Date: _____

Additional Comments:

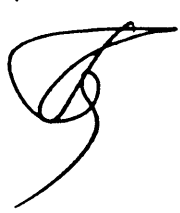
CUSTODY SEAL

Date: 4-24-97
 Signature: [Signature]

Percent Moisture Summary Report

Date: 28-APR-97
Batch: 33660
Analyst: DRH

Sample	Method	Date	Tare(g)	Wet(g)	Dry(g)	Percent Solids	Percent Moisture
129049-021	CLP SOW 390	28-APR-97	15.9295	23.1739	22.5469	91	9
129049-022	CLP SOW 390	28-APR-97	15.2732	22.3298	21.7543	92	8
129049-023	CLP SOW 390	28-APR-97	15.5778	23.268	22.6759	92	8
129049-024	CLP SOW 390	28-APR-97	15.017	20.7757	19.9657	86	14
129049-026	CLP SOW 390	28-APR-97	14.9989	21.5135	20.6834	87	13
129062-021	CLP SOW 390	28-APR-97	15.3057	23.4889	22.306	86	14
129062-022	CLP SOW 390	28-APR-97	15.3428	24.6765	24.6585	100	0
129063-001	CLP SOW 390	28-APR-97	16.0356	21.2363	20.1227	79	21
129063-003	CLP SOW 390	28-APR-97	15.3305	21.2421	20.8544	93	7
129063-004	CLP SOW 390	28-APR-97	15.0391	21.2663	21.907	110	10
129063-005	CLP SOW 390	28-APR-97	15.0029	22.44	22.3309	99	1
129063-006	CLP SOW 390	28-APR-97	15.661	21.7422	20.8455	85	15
129063-007	CLP SOW 390	28-APR-97	15.7895	23.632	22.0392	80	20
QC44869	CLP SOW 390	28-APR-97	15.3074	21.1837	19.9799	80	20
f 129063-007					RPD:	0.2%	0.9%

Analysis being
repeated
5/5/97


Percent Moisture Summary Report

Date: 06-MAY-97
Batch: 33811
Analyst: DRH

Sample	Method	Date	Tare(g)	Wet(g)	Dry(g)	Percent Solids	Percent Moisture
9063-004	CLP SOW 390	06-MAY-97	15.1763	22.6158	22.0129	92	8
45449	CLP SOW 390	06-MAY-97	15.5641	21.5662	20.9399	90	10
129063-004						RPD: 2.6%	25.1%



Volatile Organics by GC/MS

Client: Kleinfelder
 Project#: 23-900026
 Location: TEAD Lust Sites

Analysis Method: EPA 8260
 Prep Method: EPA 5030

Field ID: U3SP041501
 Lab ID: 129063-001
 Matrix: Soil
 Batch#: 33639
 Units: ug/Kg dry weight
 Diln Fac: 1

Sampled: 04/15/97
 Received: 04/25/97
 Extracted: 04/25/97
 Analyzed: 04/25/97
 Moisture: 21%

Analyte	Result	Reporting Limit
Chloromethane	ND	63
Bromomethane	ND	63
Vinyl Chloride	ND	63
Chloroethane	ND	63
Methylene Chloride	ND	13
Acetone	13	13
Carbon Disulfide	ND	130
Trichlorofluoromethane	ND	13
1,1-Dichloroethene	ND	13
1,1-Dichloroethane	ND	13
trans-1,2-Dichloroethene	ND	6.3
cis-1,2-Dichloroethene	ND	6.3
Chloroform	ND	13
1,2-Dichloroethane	ND	13
2-Butanone	ND	130
1,1,1-Trichloroethane	ND	13
Carbon Tetrachloride	ND	13
Vinyl Acetate	ND	130
Bromodichloromethane	ND	13
Dibromomethane	ND	13
1,2-Dichloropropane	ND	13
cis-1,3-Dichloropropene	ND	13
Trichloroethene	ND	13
Dibromochloromethane	ND	63
1,1,2-Trichloroethane	ND	13
Benzene	ND	13
trans-1,3-Dichloropropene	ND	13
Bromoform	ND	13
2-Hexanone	ND	130
4-Methyl-2-Pentanone	ND	130
1,1,2,2-Tetrachloroethane	ND	13
Tetrachloroethene	ND	13
Toluene	ND	13
Chlorobenzene	ND	13
Ethylbenzene	ND	13
Styrene	ND	13
m,p-Xylenes	ND	6.3
o-Xylene	ND	6.3
1,2,3-Trichloropropane	ND	13
1,3-Dichlorobenzene	ND	13
1,4-Dichlorobenzene	ND	13
1,2-Dichlorobenzene	ND	13
Naphthalene	ND	63
Surrogate	%Recovery	Recovery Limits
Toluene-d8	113	84-138
Bromofluorobenzene	109	59-113
1,2-Dichloroethane-d4	94	76-114



Volatile Organics by GC/MS

Client: Kleinfelder
Project#: 23-900026
Location: TEAD Lust Sites

Analysis Method: EPA 8260
Prep Method: EPA 5030

Field ID: U3W2041501
Lab ID: 129063-002
Matrix: Water
Batch#: 33638
Units: ug/L
Diln Fac: 1

Sampled: 04/15/97
Received: 04/25/97
Extracted: 04/25/97
Analyzed: 04/25/97

Analyte	Result	Reporting Limit
Chloromethane	ND	10
Bromomethane	ND	10
Vinyl Chloride	ND	10
Chloroethane	ND	10
Methylene Chloride	ND	10
Acetone	ND	50
Carbon Disulfide	ND	50
Trichlorofluoromethane	ND	5.0
1,1-Dichloroethene	ND	5.0
1,1-Dichloroethane	ND	5.0
trans-1,2-Dichloroethene	ND	5.0
cis-1,2-Dichloroethene	ND	5.0
Chloroform	ND	5.0
1,2-Dichloroethane	ND	5.0
2-Butanone	ND	5.0
1,1,1-Trichloroethane	ND	50
Carbon Tetrachloride	ND	5.0
Vinyl Acetate	ND	5.0
Bromodichloromethane	ND	50
Dibromomethane	ND	5.0
1,2-Dichloropropane	ND	5.0
cis-1,3-Dichloropropene	ND	5.0
Trichloroethene	ND	5.0
Dibromochloromethane	ND	5.0
1,1,2-Trichloroethane	ND	50
Benzene	ND	5.0
trans-1,3-Dichloropropene	ND	5.0
Bromoform	ND	5.0
2-Hexanone	ND	5.0
4-Methyl-2-Pentanone	ND	50
1,1,2,2-Tetrachloroethane	ND	5.0
Tetrachloroethene	ND	5.0
Toluene	ND	5.0
Chlorobenzene	ND	5.0
Ethylbenzene	ND	5.0
Styrene	ND	5.0
m,p-Xylenes	ND	5.0
o-Xylene	ND	5.0
1,2,3-Trichloropropane	ND	5.0
1,3-Dichlorobenzene	ND	5.0
1,4-Dichlorobenzene	ND	5.0
1,2-Dichlorobenzene	ND	5.0
Naphthalene	ND	5.0
		10

Surrogate	%Recovery	Recovery Limits
1,2-Dichloroethane-d4	104	76-114
Toluene-d8	97	88-110
Bromofluorobenzene	99	86-115



Volatile Organics by GC/MS

Client: Kleinfelder
Project#: 23-900026
Location: TEAD Lust Sites

Analysis Method: EPA 8260
Prep Method: EPA 5030

Field ID: U3SP041801
Lab ID: 129063-003
Matrix: Soil
Batch#: 33639
Units: ug/Kg dry weight
Diln Fac: 1

Sampled: 04/18/97
Received: 04/25/97
Extracted: 04/25/97
Analyzed: 04/25/97
Moisture: 7%

Analyte	Result	Reporting Limit
Chloromethane	ND	54
Bromomethane	ND	54
Vinyl Chloride	ND	54
Chloroethane	ND	54
Methylene Chloride	ND	54
Acetone	11	11
Carbon Disulfide	ND	11
Trichlorofluoromethane	ND	110
1,1-Dichloroethene	ND	11
1,1-Dichloroethane	ND	11
trans-1,2-Dichloroethene	ND	11
cis-1,2-Dichloroethene	ND	5.4
Chloroform	ND	5.4
1,2-Dichloroethane	ND	11
2-Butanone	ND	11
1,1,1-Trichloroethane	ND	110
Carbon Tetrachloride	ND	11
Vinyl Acetate	ND	11
Bromodichloromethane	ND	110
Dibromomethane	ND	11
1,2-Dichloropropane	ND	11
cis-1,3-Dichloropropane	ND	11
Trichloroethene	ND	11
Dibromochloromethane	ND	11
1,1,2-Trichloroethane	ND	54
Benzene	ND	11
trans-1,3-Dichloropropane	ND	11
Bromoform	ND	11
2-Hexanone	ND	11
4-Methyl-2-Pentanone	ND	110
1,1,2,2-Tetrachloroethane	ND	110
Tetrachloroethene	ND	11
Toluene	ND	11
Chlorobenzene	ND	11
Ethylbenzene	ND	11
Styrene	ND	11
m,p-Xylenes	ND	11
o-Xylene	ND	5.4
1,2,3-Trichloropropane	ND	5.4
1,3-Dichlorobenzene	ND	11
1,4-Dichlorobenzene	ND	11
1,2-Dichlorobenzene	ND	11
Naphthalene	ND	11
		54
Surrogate	%Recovery	Recovery Limits
Toluene-d8	99	84-138
Bromofluorobenzene	101	59-113
1,2-Dichloroethane-d4	97	76-114



Volatile Organics by GC/MS

Client: Kleinfelder
Project#: 23-900026
Location: TEAD Lust Sites

Analysis Method: EPA 8260
Prep Method: EPA 5030

Field ID: U3SP041802
Lab ID: 129063-004
Matrix: Soil
Batch#: 33639
Units: ug/Kg dry weight
Diln Fac: 1

Sampled: 04/18/97
Received: 04/25/97
Extracted: 04/25/97
Analyzed: 04/25/97
Moisture: 8%

Analyte	Result	Reporting Limit
Chloromethane	ND	54
Bromomethane	ND	54
Vinyl Chloride	ND	54
Chloroethane	ND	54
Methylene Chloride	ND	11
Acetone	13	11
Carbon Disulfide	ND	110
Trichlorofluoromethane	ND	11
1,1-Dichloroethene	ND	11
1,1-Dichloroethane	ND	11
trans-1,2-Dichloroethene	ND	5.4
cis-1,2-Dichloroethene	ND	5.4
Chloroform	ND	11
1,2-Dichloroethane	ND	11
2-Butanone	ND	110
1,1,1-Trichloroethane	ND	11
Carbon Tetrachloride	ND	11
Vinyl Acetate	ND	110
Bromodichloromethane	ND	11
Dibromomethane	ND	11
1,2-Dichloropropane	ND	11
cis-1,3-Dichloropropene	ND	11
Trichloroethene	ND	11
Dibromochloromethane	ND	54
1,1,2-Trichloroethane	ND	11
Benzene	ND	11
trans-1,3-Dichloropropene	ND	11
Bromoform	ND	11
2-Hexanone	ND	110
4-Methyl-2-Pentanone	ND	110
1,1,2,2-Tetrachloroethane	ND	11
Tetrachloroethene	ND	11
Toluene	ND	11
Chlorobenzene	ND	11
Ethylbenzene	ND	11
Styrene	ND	11
m,p-Xylenes	ND	5.4
o-Xylene	ND	5.4
1,2,3-Trichloropropane	ND	11
1,3-Dichlorobenzene	ND	11
1,4-Dichlorobenzene	ND	11
1,2-Dichlorobenzene	ND	11
Naphthalene	ND	54

Surrogate	%Recovery	Recovery Limits
Toluene-d8	89	84-138
Bromofluorobenzene	100	59-113
1,2-Dichloroethane-d4	96	76-114



Volatile Organics by GC/MS

Client: Kleinfelder
Project#: 23-900026
Location: TEAD Lust Sites

Analysis Method: EPA 8260
Prep Method: EPA 5030

Field ID: U3SP041701
Lab ID: 129063-005
Matrix: Soil
Batch#: 33639
Units: ug/Kg dry weight
Diln Fac: 1

Sampled: 04/18/97
Received: 04/25/97
Extracted: 04/25/97
Analyzed: 04/25/97
Moisture: 1%

Analyte	Result	Reporting Limit
Chloromethane	ND	51
Bromomethane	ND	51
Vinyl Chloride	ND	51
Chloroethane	ND	51
Methylene Chloride	ND	10
Acetone	24	10
Carbon Disulfide	ND	100
Trichlorofluoromethane	ND	10
1,1-Dichloroethene	ND	10
1,1-Dichloroethane	ND	10
trans-1,2-Dichloroethene	ND	5.1
cis-1,2-Dichloroethene	ND	5.1
Chloroform	ND	10
1,2-Dichloroethane	ND	10
2-Butanone	ND	100
1,1,1-Trichloroethane	ND	10
Carbon Tetrachloride	ND	10
Vinyl Acetate	ND	100
Bromodichloromethane	ND	10
Dibromomethane	ND	10
1,2-Dichloropropane	ND	10
cis-1,3-Dichloropropene	ND	10
Trichloroethene	ND	10
Dibromochloromethane	ND	51
1,1,2-Trichloroethane	ND	10
Benzene	ND	10
trans-1,3-Dichloropropene	ND	10
Bromoform	ND	10
2-Hexanone	ND	100
4-Methyl-2-Pentanone	ND	100
1,1,2,2-Tetrachloroethane	ND	10
Tetrachloroethene	ND	10
Toluene	ND	10
Chlorobenzene	ND	10
Ethylbenzene	ND	10
Styrene	ND	10
m,p-Xylenes	ND	5.1
o-Xylene	ND	5.1
1,2,3-Trichloropropane	ND	10
1,3-Dichlorobenzene	ND	10
1,4-Dichlorobenzene	ND	10
1,2-Dichlorobenzene	ND	10
Naphthalene	ND	51
Surrogate	%Recovery	Recovery Limits
Toluene-d8	92	84-138
Bromofluorobenzene	96	59-113
1,2-Dichloroethane-d4	96	76-114

Lab #: 129063

BATCH QC REPORT

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EPA 8260 Volatile Organics

Client: Kleinfelder
Project#: 23-900026
Location: TEAD Lust Sites

Analysis Method: EPA 8260
Prep Method: EPA 5030

METHOD BLANK

Matrix: Soil
Batch#: 33639
Units: ug/Kg
Diln Fac: 1

Prep Date: 04/25/97
Analysis Date: 04/25/97

MB Lab ID: QC44778

Analyte	Result	Reporting Limit
Chloromethane	ND	50
Bromomethane	ND	50
Vinyl Chloride	ND	50
Chloroethane	ND	50
Methylene Chloride	ND	10
Acetone	ND	10
Carbon Disulfide	ND	100
Trichlorofluoromethane	ND	10
1,1-Dichloroethene	ND	10
1,1-Dichloroethane	ND	10
trans-1,2-Dichloroethene	ND	5.0
cis-1,2-Dichloroethene	ND	5.0
Chloroform	ND	10
1,2-Dichloroethane	ND	10
2-Butanone	ND	100
1,1,1-Trichloroethane	ND	10
Carbon Tetrachloride	ND	10
Vinyl Acetate	ND	100
Bromodichloromethane	ND	10
Dibromomethane	ND	10
1,2-Dichloropropane	ND	10
cis-1,3-Dichloropropene	ND	10
Trichloroethene	ND	10
Dibromochloromethane	ND	50
1,1,2-Trichloroethane	ND	10
Benzene	ND	10
trans-1,3-Dichloropropene	ND	10
Bromoform	ND	10
2-Hexanone	ND	100
4-Methyl-2-Pentanone	ND	100
1,1,2,2-Tetrachloroethane	ND	10
Tetrachloroethene	ND	10
Toluene	ND	10
Chlorobenzene	ND	10
Ethylbenzene	ND	10
Styrene	ND	10
m,p-Xylenes	ND	5.0
o-Xylene	ND	5.0

Lab #: 129063

BATCH QC REPORT

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EPA 8260 Volatile Organics	
Client: Kleinfelder	Analysis Method: EPA 8260
Project#: 23-900026	Prep Method: EPA 5030
Location: TEAD Lust Sites	
METHOD BLANK	
Matrix: Soil	Prep Date: 04/25/97
Batch#: 33639	Analysis Date: 04/25/97
Units: ug/Kg	
Diln Fac: 1	

MB Lab ID: QC44778

Analyte	Result	Reporting Limit
1,2,3-Trichloropropane	ND	10
1,3-Dichlorobenzene	ND	10
1,4-Dichlorobenzene	ND	10
1,2-Dichlorobenzene	ND	10
Naphthalene	ND	50
Surrogate	%Rec	Recovery Limits
Toluene-d8	106	84-138
Bromofluorobenzene	104	59-113
Dibromofluoromethane	110	70-121
1,2-Dichloroethane-d4	101	70-121



Lab #: 129063

BATCH QC REPORT

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EPA 8260 Volatile Organics

Client: Kleinfelder
Project#: 23-900026
Location: TEAD Lust Sites

Analysis Method: EPA 8260
Prep Method: EPA 5030

METHOD BLANK

Matrix: Water
Batch#: 33638
Units: ug/L
Diln Fac: 1

Prep Date: 04/25/97
Analysis Date: 04/25/97

MB Lab ID: QC44774

Analyte	Result	Reporting Limit
Chloromethane	ND	10
Bromomethane	ND	10
Vinyl Chloride	ND	10
Chloroethane	ND	10
Methylene Chloride	ND	10
Acetone	ND	10
Carbon Disulfide	ND	50
Trichlorofluoromethane	ND	50
1,1-Dichloroethene	ND	5.0
1,1-Dichloroethane	ND	5.0
trans-1,2-Dichloroethene	ND	5.0
cis-1,2-Dichloroethene	ND	5.0
Chloroform	ND	5.0
1,2-Dichloroethane	ND	5.0
2-Butanone	ND	5.0
1,1,1-Trichloroethane	ND	50
Carbon Tetrachloride	ND	5.0
Vinyl Acetate	ND	5.0
Bromodichloromethane	ND	50
Dibromomethane	ND	5.0
1,2-Dichloropropane	ND	5.0
cis-1,3-Dichloropropene	ND	5.0
Trichloroethene	ND	5.0
Dibromochloromethane	ND	5.0
1,1,2-Trichloroethane	ND	50
Benzene	ND	5.0
trans-1,3-Dichloropropene	ND	5.0
Bromoform	ND	5.0
2-Hexanone	ND	5.0
4-Methyl-2-Pentanone	ND	50
1,1,2,2-Tetrachloroethane	ND	50
Tetrachloroethene	ND	5.0
Toluene	ND	5.0
Chlorobenzene	ND	5.0
Ethylbenzene	ND	5.0
Styrene	ND	5.0
m,p-Xylenes	ND	5.0
o-Xylene	ND	5.0

Lab #: 129063

BATCH QC REPORT



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EPA 8260 Volatile Organics

Client: Kleinfelder	Analysis Method: EPA 8260
Project#: 23-900026	Prep Method: EPA 5030
Location: TEAD Lust Sites	

METHOD BLANK

Matrix: Water	Prep Date: 04/25/97
Batch#: 33638	Analysis Date: 04/25/97
Units: ug/L	
Diln Fac: 1	

MB Lab ID: QC44774

Analyte	Result	Reporting Limit
1,2,3-Trichloropropane	ND	5.0
1,3-Dichlorobenzene	ND	5.0
1,4-Dichlorobenzene	ND	5.0
1,2-Dichlorobenzene	ND	5.0
Naphthalene	ND	10
Surrogate	%Rec	Recovery Limits
1,2-Dichloroethane-d4	103	76-114
Toluene-d8	99	88-110
Bromofluorobenzene	99	86-115
Dibromofluoromethane	103	76-114



Lab #: 129063

BATCH QC REPORT

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EPA 8260 Volatile Organics

Client: Kleinfelder
Project#: 23-900026
Location: TEAD Lust Sites

Analysis Method: EPA 8260
Prep Method: EPA 5030

METHOD BLANK

Matrix: Water
Batch#: 33638
Units: ug/L
Diln Fac: 1

Prep Date: 04/25/97
Analysis Date: 04/25/97

MB Lab ID: QC44802

Analyte	Result	Reporting Limit
Chloromethane	ND	10
Bromomethane	ND	10
Vinyl Chloride	ND	10
Chloroethane	ND	10
Methylene Chloride	ND	10
Acetone	ND	50
Carbon Disulfide	ND	50
Trichlorofluoromethane	ND	5.0
1,1-Dichloroethene	ND	5.0
1,1-Dichloroethane	ND	5.0
trans-1,2-Dichloroethene	ND	5.0
cis-1,2-Dichloroethene	ND	5.0
Chloroform	ND	5.0
1,2-Dichloroethane	ND	5.0
2-Butanone	ND	5.0
1,1,1-Trichloroethane	ND	50
Carbon Tetrachloride	ND	5.0
Vinyl Acetate	ND	5.0
Bromodichloromethane	ND	50
Dibromomethane	ND	5.0
1,2-Dichloropropane	ND	5.0
cis-1,3-Dichloropropene	ND	5.0
Trichloroethene	ND	5.0
Dibromochloromethane	ND	5.0
1,1,2-Trichloroethane	ND	50
Benzene	ND	5.0
trans-1,3-Dichloropropene	ND	5.0
Bromoform	ND	5.0
2-Hexanone	ND	5.0
4-Methyl-2-Pentanone	ND	50
1,1,2,2-Tetrachloroethane	ND	50
Tetrachloroethene	ND	5.0
Toluene	ND	5.0
Chlorobenzene	ND	5.0
Ethylbenzene	ND	5.0
Styrene	ND	5.0
m,p-Xylenes	ND	5.0
o-Xylene	ND	5.0



Lab #: 129063

BATCH QC REPORT

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EPA 8260 Volatile Organics

Client: Kleinfelder
Project#: 23-900026
Location: TEAD Lust Sites

Analysis Method: EPA 8260
Prep Method: EPA 5030

METHOD BLANK

Matrix: Water
Batch#: 33638
Units: ug/L
Diln Fac: 1

Prep Date: 04/25/97
Analysis Date: 04/25/97

MB Lab ID: QC44802

Analyte	Result	Reporting Limit
1,2,3-Trichloropropane	ND	5.0
1,3-Dichlorobenzene	ND	5.0
1,4-Dichlorobenzene	ND	5.0
1,2-Dichlorobenzene	ND	5.0
Naphthalene	ND	10
Surrogate	%Rec	Recovery Limits
1,2-Dichloroethane-d4	101	76-114
Toluene-d8	98	88-110
Bromofluorobenzene	98	86-115
Dibromofluoromethane	103	76-114

Lab #: 129063

BATCH QC REPORT

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EPA 8260 Volatile Organics

Client: Kleinfelder
Project#: 23-900026
Location: TEAD Lust Sites

Analysis Method: EPA 8260
Prep Method: EPA 5030

MATRIX SPIKE/MATRIX SPIKE DUPLICATE

Field ID: ZZZZZZ
Lab ID: 129033-020
Matrix: Soil
Batch#: 33639
Units: ug/Kg
Diln Fac: 1

Sample Date: 04/19/97
Received Date: 04/22/97
Prep Date: 04/25/97
Analysis Date: 04/25/97

MS Lab ID: QC44797

Analyte	Spike Added	Sample	MS	%Rec #	Limits
1,1-Dichloroethene	50	<10	46.45	93	59-172
Trichloroethene	50	<10	47.5	95	62-137
Benzene	50	<10	49.59	99	66-142
Toluene	50	<10	56.45	113	59-139
Chlorobenzene	50	<10	48.68	97	60-133
Surrogate	%Rec	Limits			
Toluene-d8	109	84-138			
Bromofluorobenzene	107	59-113			
Dibromofluoromethane	113	70-121			
1,2-Dichloroethane-d4	95	70-121			

MSD Lab ID: QC44798

Analyte	Spike Added	MSD	%Rec #	Limits	RPD #	Limit
1,1-Dichloroethene	50	48.4	97	59-172	4	35
Trichloroethene	50	48.62	97	62-137	2	35
Benzene	50	51.04	102	66-142	3	35
Toluene	50	55.91	112	59-139	1	35
Chlorobenzene	50	50.84	102	60-133	4	35
Surrogate	%Rec	Limits				
Toluene-d8	103	84-138				
Bromofluorobenzene	106	59-113				
Dibromofluoromethane	111	70-121				
1,2-Dichloroethane-d4	92	70-121				

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

RPD: 0 out of 5 outside limits

Spike Recovery: 0 out of 10 outside limits

Lab #: 129063

BATCH QC REPORT



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EPA 8260 Volatile Organics

Client: Kleinfelder
 Project#: 23-900026
 Location: TEAD Lust Sites

Analysis Method: EPA 8260
 Prep Method: EPA 5030

MATRIX SPIKE/MATRIX SPIKE DUPLICATE

Field ID: ZZZZZZ
 Lab ID: 128944-002
 Matrix: Water
 Batch#: 33638
 Units: ug/L
 Diln Fac: 1

Sample Date: 04/11/97
 Received Date: 04/11/97
 Prep Date: 04/25/97
 Analysis Date: 04/25/97

MS Lab ID: QC44799

Analyte	Spike Added	Sample	MS	%Rec #	Limits
1,1-Dichloroethene	50	<5	57.41	115	61-145
Trichloroethene	50	<5	50.41	100	71-120
Benzene	50	<5	48.4	95	76-127
Toluene	50	<5	51.3	102	76-125
Chlorobenzene	50	22.28	69.39	94	75-130
Surrogate	%Rec	Limits			
1,2-Dichloroethane-d4	101	76-114			
Toluene-d8	98	88-110			
Bromofluorobenzene	97	86-115			
Dibromofluoromethane	102	76-114			

MSD Lab ID: QC44800

Analyte	Spike Added	MSD	%Rec #	Limits	RPD #	Limit
1,1-Dichloroethene	50	52.71	105	61-145	9	20
Trichloroethene	50	48.7	97	71-120	3	20
Benzene	50	46.92	92	76-127	3	20
Toluene	50	48.63	96	76-125	5	20
Chlorobenzene	50	67.89	91	75-130	2	20
Surrogate	%Rec	Limits				
1,2-Dichloroethane-d4	100	76-114				
Toluene-d8	98	88-110				
Bromofluorobenzene	96	86-115				
Dibromofluoromethane	101	76-114				

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

RPD: 0 out of 5 outside limits

Spike Recovery: 0 out of 10 outside limits



Lab #: 129063

BATCH QC REPORT

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EPA 8260 Volatile Organics

Client: Kleinfelder
Project#: 23-900026
Location: TEAD Lust Sites

Analysis Method: EPA 8260
Prep Method: EPA 5030

LABORATORY CONTROL SAMPLE

Matrix: Soil
Batch#: 33639
Units: ug/Kg
Diln Fac: 1

Prep Date: 04/25/97
Analysis Date: 04/25/97

LCS Lab ID: QC44777

Analyte	Result	Spike Added	%Rec #	Limits
1,1-Dichloroethene	45.98	50	92	59-172
Trichloroethene	46.84	50	94	62-137
Benzene	51.45	50	103	66-142
Toluene	56.55	50	113	59-139
Chlorobenzene	48.49	50	97	60-133

Surrogate	%Rec	Limits
Toluene-d8	108	84-138
Bromofluorobenzene	102	59-113
Dibromofluoromethane	110	70-121
1,2-Dichloroethane-d4	104	70-121

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

Spike Recovery: 0 out of 5 outside limits



Lab #: 129063

BATCH QC REPORT

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EPA 8260 Volatile Organics

Client: Kleinfelder
Project#: 23-900026
Location: TEAD Lust Sites

Analysis Method: EPA 8260
Prep Method: EPA 5030

LABORATORY CONTROL SAMPLE

Matrix: Water
Batch#: 33638
Units: ug/L
Diln Fac: 1

Prep Date: 04/25/97
Analysis Date: 04/25/97

LCS Lab ID: QC44773

Analyte	Result	Spike Added	%Rec #	Limits
1,1-Dichloroethene	54.44	50	109	61-145
Trichloroethene	49.79	50	100	71-120
Benzene	47.25	50	94	76-127
Toluene	49.13	50	98	76-125
Chlorobenzene	49.45	50	99	75-130
Surrogate	%Rec	Limits		
1,2-Dichloroethane-d4	99	76-114		
Toluene-d8	97	88-110		
Bromofluorobenzene	97	86-115		
Dibromofluoromethane	104	76-114		

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

Spike Recovery: 0 out of 5 outside limits



Semivolatile Organics by GC/MS

Client: Kleinfelder
Project#: 23-900026
Location: TEAD Lust Sites

Analysis Method: EPA 8270
Prep Method: EPA 3550

Field ID: U3SP041501
Lab ID: 129063-001
Matrix: Soil
Batch#: 33713
Units: ug/Kg dry weight
Diln Fac: 1

Sampled: 04/15/97
Received: 04/25/97
Extracted: 04/29/97
Analyzed: 05/05/97
Moisture: 21%

Analyte	Result	Reporting Limit
Phenol	ND	420
2-Chlorophenol	ND	420
Benzyl alcohol	ND	420
2-Methylphenol	ND	420
4-Methylphenol	ND	420
2-Nitrophenol	ND	420
2,4-Dimethylphenol	ND	2200
Benzoic acid	ND	420
2,4-Dichlorophenol	ND	2200
4-Chloro-3-methylphenol	ND	420
2,4,6-Trichlorophenol	ND	420
2,4,5-Trichlorophenol	ND	420
2,4-Dinitrophenol	ND	2200
4-Nitrophenol	ND	2200
4,6-Dinitro-2-methylphenol	ND	2200
Pentachlorophenol	ND	2200
N-Nitrosodimethylamine	ND	2200
Aniline	ND	420
bis(2-Chloroethyl) ether	ND	420
1,3-Dichlorobenzene	ND	420
1,4-Dichlorobenzene	ND	420
1,2-Dichlorobenzene	ND	420
bis(2-Chloroisopropyl) ether	ND	420
N-Nitroso-di-n-propylamine	ND	420
Hexachloroethane	ND	420
Nitrobenzene	ND	420
Isophorone	ND	420
bis(2-Chloroethoxy) methane	ND	420
1,2,4-Trichlorobenzene	ND	420
Naphthalene	ND	420
4-Chloroaniline	ND	420
Hexachlorobutadiene	ND	420
2-Methylnaphthalene	ND	420
Hexachlorocyclopentadiene	ND	420
2-Chloronaphthalene	ND	420
2-Nitroaniline	ND	420
Dimethylphthalate	ND	2200
Acenaphthylene	ND	420



Semivolatile Organics by GC/MS

Field ID: U3SP041501
Lab ID: 129063-001
Matrix: Soil
Batch#: 33713
Units: ug/Kg dry weight
Diln Fac: 1

Sampled: 04/15/97
Received: 04/25/97
Extracted: 04/29/97
Analyzed: 05/05/97
Moisture: 21%

Analyte	Result	Reporting Limit
2,6-Dinitrotoluene	ND	420
3-Nitroaniline	ND	2200
Acenaphthene	ND	420
Dibenzofuran	ND	420
2,4-Dinitrotoluene	ND	420
Diethylphthalate	ND	420
4-Chlorophenyl-phenylether	ND	420
Fluorene	ND	420
4-Nitroaniline	ND	2200
N-Nitrosodiphenylamine	ND	420
Azobenzene	ND	420
4-Bromophenyl-phenylether	ND	420
Hexachlorobenzene	ND	420
Phenanthrene	ND	420
Anthracene	ND	420
Di-n-butylphthalate	ND	420
Fluoranthene	ND	420
Benzidine	ND	420
Pyrene	ND	420
Butylbenzylphthalate	ND	420
3,3'-Dichlorobenzidine	ND	2200
Benzo(a)anthracene	ND	420
Chrysene	ND	420
bis(2-Ethylhexyl)phthalate	ND	420
Di-n-octylphthalate	ND	420
Benzo(b)fluoranthene	ND	420
Benzo(k)fluoranthene	ND	420
Benzo(a)pyrene	ND	420
Indeno(1,2,3-cd)pyrene	ND	420
Dibenz(a,h)anthracene	ND	420
Benzo(g,h,i)perylene	ND	420
Surrogate	%Recovery	Recovery Limits
2-Fluorophenol	65	25-121
Phenol-d5	71	24-113
2,4,6-Tribromophenol	63	19-122
Nitrobenzene-d5	70	23-120
2-Fluorobiphenyl	82	30-115
Terphenyl-d14	95	18-137



Semivolatile Organics by GC/MS

Client: Kleinfelder
Project#: 23-900026
Location: TEAD Lust Sites

Analysis Method: EPA 8270
Prep Method: EPA 3550

Field ID: U3SP041801
Lab ID: 129063-003
Matrix: Soil
Batch#: 33713
Units: ug/Kg dry weight
Diln Fac: 1

Sampled: 04/18/97
Received: 04/25/97
Extracted: 04/29/97
Analyzed: 05/05/97
Moisture: 7%

Analyte	Result	Reporting Limit
Phenol	ND	350
2-Chlorophenol	ND	350
Benzyl alcohol	ND	350
2-Methylphenol	ND	350
4-Methylphenol	ND	350
2-Nitrophenol	ND	350
2,4-Dimethylphenol	ND	1800
Benzoic acid	ND	350
2,4-Dichlorophenol	ND	1800
4-Chloro-3-methylphenol	ND	350
2,4,6-Trichlorophenol	ND	350
2,4,5-Trichlorophenol	ND	350
2,4-Dinitrophenol	ND	1800
4-Nitrophenol	ND	1800
4,6-Dinitro-2-methylphenol	ND	1800
Pentachlorophenol	ND	1800
N-Nitrosodimethylamine	ND	1800
Aniline	ND	350
bis(2-Chloroethyl) ether	ND	350
1,3-Dichlorobenzene	ND	350
1,4-Dichlorobenzene	ND	350
1,2-Dichlorobenzene	ND	350
bis(2-Chloroisopropyl) ether	ND	350
N-Nitroso-di-n-propylamine	ND	350
Hexachloroethane	ND	350
Nitrobenzene	ND	350
Isophorone	ND	350
bis(2-Chloroethoxy) methane	ND	350
1,2,4-Trichlorobenzene	ND	350
Naphthalene	ND	350
4-Chloroaniline	ND	350
Hexachlorobutadiene	ND	350
2-Methylnaphthalene	ND	350
Hexachlorocyclopentadiene	ND	350
2-Chloronaphthalene	ND	350
2-Nitroaniline	ND	1800
Dimethylphthalate	ND	350
Acenaphthylene	ND	350



Semivolatile Organics by GC/MS

Field ID: U3SP041801
Lab ID: 129063-003
Matrix: Soil
Batch#: 33713
Units: ug/Kg dry weight
Diln Fac: 1

Sampled: 04/18/97
Received: 04/25/97
Extracted: 04/29/97
Analyzed: 05/05/97
Moisture: 7%

Analyte	Result	Reporting Limit
2,6-Dinitrotoluene	ND	350
3-Nitroaniline	ND	1800
Acenaphthene	ND	350
Dibenzofuran	ND	350
2,4-Dinitrotoluene	ND	350
Diethylphthalate	ND	350
4-Chlorophenyl-phenylether	ND	350
Fluorene	ND	350
4-Nitroaniline	ND	1800
N-Nitrosodiphenylamine	ND	350
Azobenzene	ND	350
4-Bromophenyl-phenylether	ND	350
Hexachlorobenzene	ND	350
Phenanthrene	ND	350
Anthracene	ND	350
Di-n-butylphthalate	ND	350
Fluoranthene	ND	350
Benzidine	ND	350
Pyrene	ND	350
Butylbenzylphthalate	ND	350
3,3'-Dichlorobenzidine	ND	1800
Benzo (a) anthracene	ND	350
Chrysene	ND	350
bis (2-Ethylhexyl) phthalate	310 J	350
Di-n-octylphthalate	ND	350
Benzo (b) fluoranthene	ND	350
Benzo (k) fluoranthene	ND	350
Benzo (a) pyrene	ND	350
Indeno (1,2,3-cd) pyrene	ND	350
Dibenz (a,h) anthracene	ND	350
Benzo (g,h,i) perylene	ND	350
Surrogate	%Recovery	Recovery Limits
2-Fluorophenol	56	25-121
Phenol-d5	62	24-113
2,4,6-Tribromophenol	49	19-122
Nitrobenzene-d5	66	23-120
2-Fluorobiphenyl	78	30-115
Terphenyl-d14	83	18-137

J: Estimated Value



Semivolatile Organics by GC/MS

Client: Kleinfelder
Project#: 23-900026
Location: TEAD Lust Sites

Analysis Method: EPA 8270
Prep Method: EPA 3550

Field ID: U3SP041802
Lab ID: 129063-004
Matrix: Soil
Batch#: 33713
Units: ug/Kg dry weight
Diln Fac: 1

Sampled: 04/18/97
Received: 04/25/97
Extracted: 04/29/97
Analyzed: 05/05/97
Moisture: 8%

Analyte	Result	Reporting Limit
Phenol	ND	360
2-Chlorophenol	ND	360
Benzyl alcohol	ND	360
2-Methylphenol	ND	360
4-Methylphenol	ND	360
2-Nitrophenol	ND	1800
2,4-Dimethylphenol	ND	360
Benzoic acid	ND	1800
2,4-Dichlorophenol	ND	360
4-Chloro-3-methylphenol	ND	360
2,4,6-Trichlorophenol	ND	360
2,4,5-Trichlorophenol	ND	1800
2,4-Dinitrophenol	ND	1800
4-Nitrophenol	ND	1800
4,6-Dinitro-2-methylphenol	ND	1800
Pentachlorophenol	ND	1800
N-Nitrosodimethylamine	ND	360
Aniline	ND	360
bis(2-Chloroethyl) ether	ND	360
1,3-Dichlorobenzene	ND	360
1,4-Dichlorobenzene	ND	360
1,2-Dichlorobenzene	ND	360
bis(2-Chloroisopropyl) ether	ND	360
N-Nitroso-di-n-propylamine	ND	360
Hexachloroethane	ND	360
Nitrobenzene	ND	360
Isophorone	ND	360
bis(2-Chloroethoxy) methane	ND	360
1,2,4-Trichlorobenzene	ND	360
Naphthalene	ND	360
4-Chloroaniline	ND	360
Hexachlorobutadiene	ND	360
2-Methylnaphthalene	ND	360
Hexachlorocyclopentadiene	ND	360
2-Chloronaphthalene	ND	360
2-Nitroaniline	ND	1800
Dimethylphthalate	ND	360
Acenaphthylene	ND	360

Semivolatile Organics by GC/MS

Field ID: U3SP041802	Sampled: 04/18/97
Lab ID: 129063-004	Received: 04/25/97
Matrix: Soil	Extracted: 04/29/97
Batch#: 33713	Analyzed: 05/05/97
Units: ug/Kg dry weight	Moisture: 8%
Diln Fac: 1	

Analyte	Result	Reporting Limit
2,6-Dinitrotoluene	ND	360
3-Nitroaniline	ND	1800
Acenaphthene	ND	360
Dibenzofuran	ND	360
2,4-Dinitrotoluene	ND	360
Diethylphthalate	ND	360
4-Chlorophenyl-phenylether	ND	360
Fluorene	ND	360
4-Nitroaniline	ND	1800
N-Nitrosodiphenylamine	ND	360
Azobenzene	ND	360
4-Bromophenyl-phenylether	ND	360
Hexachlorobenzene	ND	360
Phenanthrene	ND	360
Anthracene	ND	360
Di-n-butylphthalate	ND	360
Fluoranthene	ND	360
Benzidine	ND	360
Pyrene	ND	360
Butylbenzylphthalate	ND	360
3,3'-Dichlorobenzidine	ND	1800
Benzo(a)anthracene	ND	360
Chrysene	ND	360
bis(2-Ethylhexyl)phthalate	ND	360
Di-n-octylphthalate	ND	360
Benzo(b)fluoranthene	ND	360
Benzo(k)fluoranthene	ND	360
Benzo(a)pyrene	ND	360
Indeno(1,2,3-cd)pyrene	ND	360
Dibenz(a,h)anthracene	ND	360
Benzo(g,h,i)perylene	ND	360
Surrogate	%Recovery	Recovery Limits
2-Fluorophenol	63	25-121
Phenol-d5	70	24-113
2,4,6-Tribromophenol	59	19-122
Nitrobenzene-d5	73	23-120
2-Fluorobiphenyl	86	30-115
Terphenyl-d14	94	18-137



Semivolatile Organics by GC/MS

Client: Kleinfelder
Project#: 23-900026
Location: TEAD Lust Sites

Analysis Method: EPA 8270
Prep Method: EPA 3550

Field ID: U3SP041701
Lab ID: 129063-005
Matrix: Soil
Batch#: 33713
Units: ug/Kg dry weight
Diln Fac: 1

Sampled: 04/18/97
Received: 04/25/97
Extracted: 04/29/97
Analyzed: 05/06/97
Moisture: 1%

Analyte	Result	Reporting Limit
Phenol	ND	330
2-Chlorophenol	ND	330
Benzyl alcohol	ND	330
2-Methylphenol	ND	330
4-Methylphenol	ND	330
2-Nitrophenol	ND	330
2,4-Dimethylphenol	ND	1700
Benzoic acid	ND	330
2,4-Dichlorophenol	ND	1700
4-Chloro-3-methylphenol	ND	330
2,4,6-Trichlorophenol	ND	330
2,4,5-Trichlorophenol	ND	330
2,4-Dinitrophenol	ND	1700
4-Nitrophenol	ND	1700
4,6-Dinitro-2-methylphenol	ND	1700
Pentachlorophenol	ND	1700
N-Nitrosodimethylamine	ND	330
Aniline	ND	330
bis(2-Chloroethyl) ether	ND	330
1,3-Dichlorobenzene	ND	330
1,4-Dichlorobenzene	ND	330
1,2-Dichlorobenzene	ND	330
bis(2-Chloroisopropyl) ether	ND	330
N-Nitroso-di-n-propylamine	ND	330
Hexachloroethane	ND	330
Nitrobenzene	ND	330
Isophorone	ND	330
bis(2-Chloroethoxy) methane	ND	330
1,2,4-Trichlorobenzene	ND	330
Naphthalene	ND	330
4-Chloroaniline	ND	330
Hexachlorobutadiene	ND	330
2-Methylnaphthalene	ND	330
Hexachlorocyclopentadiene	ND	330
2-Chloronaphthalene	ND	330
2-Nitroaniline	ND	1700
Dimethylphthalate	ND	330
Acenaphthylene	ND	330



Semivolatile Organics by GC/MS

Field ID: U3SP041701
Lab ID: 129063-005
Matrix: Soil
Batch#: 33713
Units: ug/Kg dry weight
Diln Fac: 1

Sampled: 04/18/97
Received: 04/25/97
Extracted: 04/29/97
Analyzed: 05/06/97
Moisture: 1%

Analyte	Result	Reporting Limit
2,6-Dinitrotoluene	ND	330
3-Nitroaniline	ND	1700
Acenaphthene	ND	330
Dibenzofuran	ND	330
2,4-Dinitrotoluene	ND	330
Diethylphthalate	ND	330
4-Chlorophenyl-phenylether	ND	330
Fluorene	ND	330
4-Nitroaniline	ND	1700
N-Nitrosodiphenylamine	ND	330
Azobenzene	ND	330
4-Bromophenyl-phenylether	ND	330
Hexachlorobenzene	ND	330
Phenanthrene	ND	330
Anthracene	ND	330
Di-n-butylphthalate	ND	330
Fluoranthene	ND	330
Benzidine	ND	330
Pyrene	ND	330
Butylbenzylphthalate	ND	330
3,3'-Dichlorobenzidine	ND	1700
Benzo(a)anthracene	ND	330
Chrysene	ND	330
bis(2-Ethylhexyl)phthalate	ND	330
Di-n-octylphthalate	ND	330
Benzo(b)fluoranthene	ND	330
Benzo(k)fluoranthene	ND	330
Benzo(a)pyrene	ND	330
Indeno(1,2,3-cd)pyrene	ND	330
Dibenz(a,h)anthracene	ND	330
Benzo(g,h,i)perylene	ND	330

Surrogate	% Recovery	Recovery Limits
2-Fluorophenol	54	25-121
Phenol-d5	64	24-113
2,4,6-Tribromophenol	47	19-122
Nitrobenzene-d5	69	23-120
2-Fluorobiphenyl	79	30-115
Terphenyl-d14	87	18-137



Lab #: 129063

BATCH QC REPORT

EPA 8270 Semi-Volatile Organics

Client: Kleinfelder
Project#: 23-900026
Location: TEAD Lust Sites

Analysis Method: EPA 8270
Prep Method: EPA 3550

METHOD BLANK

Matrix: Soil
Batch#: 33713
Units: ug/Kg
Diln Fac: 1

Prep Date: 04/29/97
Analysis Date: 05/05/97

MB Lab ID: QC45067

Analyte	Result	Reporting Limit
Phenol	ND	330
2-Chlorophenol	ND	330
Benzyl alcohol	ND	330
2-Methylphenol	ND	330
4-Methylphenol	ND	330
2-Nitrophenol	ND	330
2,4-Dimethylphenol	ND	1700
Benzoic acid	ND	330
2,4-Dichlorophenol	ND	1700
4-Chloro-3-methylphenol	ND	330
2,4,6-Trichlorophenol	ND	330
2,4,5-Trichlorophenol	ND	330
2,4-Dinitrophenol	ND	1700
4-Nitrophenol	ND	1700
4,6-Dinitro-2-methylphenol	ND	1700
Pentachlorophenol	ND	1700
N-Nitrosodimethylamine	ND	1700
Aniline	ND	330
bis(2-Chloroethyl) ether	ND	330
1,3-Dichlorobenzene	ND	330
1,4-Dichlorobenzene	ND	330
1,2-Dichlorobenzene	ND	330
bis(2-Chloroisopropyl) ether	ND	330
N-Nitroso-di-n-propylamine	ND	330
Hexachloroethane	ND	330
Nitrobenzene	ND	330
Isophorone	ND	330
bis(2-Chloroethoxy) methane	ND	330
1,2,4-Trichlorobenzene	ND	330
Naphthalene	ND	330
4-Chloroaniline	ND	330
Hexachlorobutadiene	ND	330
2-Methylnaphthalene	ND	330
Hexachlorocyclopentadiene	ND	330
2-Chloronaphthalene	ND	330
2-Nitroaniline	ND	330
Dimethylphthalate	ND	1700
Acenaphthylene	ND	330
2,6-Dinitrotoluene	ND	330
3-Nitroaniline	ND	330
		1700

Lab #: 129063

BATCH QC REPORT



Curtis & Tompkins, Ltd.

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EPA 8270 Semi-Volatile Organics

Client: Kleinfelder
 Project#: 23-900026
 Location: TEAD Lust Sites

Analysis Method: EPA 8270
 Prep Method: EPA 3550

METHOD BLANK

Matrix: Soil
 Batch#: 33713
 Units: ug/Kg
 Diln Fac: 1

Prep Date: 04/29/97
 Analysis Date: 05/05/97

MB Lab ID: QC45067

Analyte	Result	Reporting Limit
Acenaphthene	ND	330
Dibenzofuran	ND	330
2,4-Dinitrotoluene	ND	330
Diethylphthalate	ND	330
4-Chlorophenyl-phenylether	ND	330
Fluorene	ND	330
4-Nitroaniline	ND	330
N-Nitrosodiphenylamine	ND	1700
Azobenzene	ND	330
4-Bromophenyl-phenylether	ND	330
Hexachlorobenzene	ND	330
Phenanthrene	ND	330
Anthracene	ND	330
Di-n-butylphthalate	ND	330
Fluoranthene	ND	330
Benzidine	ND	330
Pyrene	ND	330
Butylbenzylphthalate	ND	330
3,3'-Dichlorobenzidine	ND	330
Benzo(a)anthracene	ND	1700
Chrysene	ND	330
bis(2-Ethylhexyl)phthalate	ND	330
Di-n-octylphthalate	ND	330
Benzo(b)fluoranthene	ND	330
Benzo(k)fluoranthene	ND	330
Benzo(a)pyrene	ND	330
Indeno(1,2,3-cd)pyrene	ND	330
Dibenz(a,h)anthracene	ND	330
Benzo(g,h,i)perylene	ND	330
Surrogate	%Rec	Recovery Limits
2-Fluorophenol	63	25-121
Phenol-d5	69	24-113
2,4,6-Tribromophenol	57	19-122
Nitrobenzene-d5	72	23-120
2-Fluorobiphenyl	87	30-115
Terphenyl-d14	88	18-137



Lab #: 129063

BATCH QC REPORT

EPA 8270 Semi-Volatile Organics

Client: Kleinfelder
Project#: 23-900026
Location: TEAD Lust Sites

Analysis Method: EPA 8270
Prep Method: EPA 3550

LABORATORY CONTROL SAMPLE

Matrix: Soil
Batch#: 33713
Units: ug/Kg
Diln Fac: 1

Prep Date: 04/29/97
Analysis Date: 05/05/97

LCS Lab ID: QC45068

Analyte	Result	Spike Added	%Rec #	Limits
Phenol	2544	3333	76	26-90
2-Chlorophenol	2652	3333	80	25-102
4-Chloro-3-methylphenol	2576	3333	77	26-103
4-Nitrophenol	2177	3333	65	11-114
Pentachlorophenol	2066	3333	62	17-109
1,4-Dichlorobenzene	1221	1667	73	28-104
N-Nitroso-di-n-propylamine	819.2	1667	49	41-126
1,2,4-Trichlorobenzene	1260	1667	76	38-107
Acenaphthene	1426	1667	86	31-137
2,4-Dinitrotoluene	930.4	1667	56	28-89
Pyrene	1367	1667	82	35-142
Surrogate	%Rec	Limits		
2-Fluorophenol	69	25-121		
Phenol-d5	72	24-113		
2,4,6-Tribromophenol	67	19-122		
Nitrobenzene-d5	75	23-120		
2-Fluorobiphenyl	88	30-115		
Terphenyl-d14	92	18-137		

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

Spike Recovery: 0 out of 11 outside limits

DO: Surrogate diluted out

Lab #: 129063

BATCH QC REPORT



Curtis & Tompkins, Ltd

Page 1 of 1

EPA 8270 Semi-Volatile Organics

Client: Kleinfelder
 Project#: 23-900026
 Location: TEAD Lust Sites

Analysis Method: EPA 8270
 Prep Method: EPA 3550

MATRIX SPIKE/MATRIX SPIKE DUPLICATE

Field ID: ZZZZZZ
 Lab ID: 129034-020
 Matrix: Soil
 Batch#: 33713
 Units: ug/Kg
 Diln Fac: 1

Sample Date: 04/22/97
 Received Date: 04/22/97
 Prep Date: 04/29/97
 Analysis Date: 05/05/97

MS Lab ID: QC45069

Analyte	Spike Added	Sample	MS	%Rec #	Limits
Phenol	3333	<333.3	2303	69	26-90
2-Chlorophenol	3333	<333.3	2471	74	25-102
4-Chloro-3-methylphenol	3333	<333.3	2299	69	26-103
4-Nitrophenol	3333	<1667	1923	58	11-114
Pentachlorophenol	3333	<1667	692.5	21	17-109
1,4-Dichlorobenzene	1667	<333.3	998.3	60	28-104
N-Nitroso-di-n-propylamine	1667	<333.3	1007	60	41-126
1,2,4-Trichlorobenzene	1667	<333.3	1121	67	38-107
Acenaphthene	1667	<333.3	1247	75	31-137
2,4-Dinitrotoluene	1667	<333.3	886.8	53	28-89
Pyrene	1667	<333.3	1124	67	35-142
Surrogate	%Rec	Limits			
2-Fluorophenol	65	25-121			
Phenol-d5	67	24-113			
2,4,6-Tribromophenol	59	19-122			
Nitrobenzene-d5	72	23-120			
2-Fluorobiphenyl	80	30-115			
Terphenyl-d14	81	18-137			

MSD Lab ID: QC45070

Analyte	Spike Added	MSD	%Rec #	Limits	RPD #	Limit
Phenol	3333	2438	73	26-90	6	35
2-Chlorophenol	3333	2607	78	25-102	5	50
4-Chloro-3-methylphenol	3333	2583	77	26-103	11	33
4-Nitrophenol	3333	2257	68	11-114	16	50
Pentachlorophenol	3333	1056	32	17-109	42	47
1,4-Dichlorobenzene	1667	1096	66	28-104	10	27
N-Nitroso-di-n-propylamine	1667	1045	63	41-126	5	38
1,2,4-Trichlorobenzene	1667	1227	74	38-107	10	23
Acenaphthene	1667	1407	84	31-137	11	19
2,4-Dinitrotoluene	1667	1018	61	28-89	14	47
Pyrene	1667	1367	82	35-142	20	36
Surrogate	%Rec	Limits				
2-Fluorophenol	69	25-121				
Phenol-d5	71	24-113				
2,4,6-Tribromophenol	70	19-122				
Nitrobenzene-d5	78	23-120				
2-Fluorobiphenyl	90	30-115				
Terphenyl-d14	95	18-137				

Column to be used to flag recovery and RPD values with an asterisk
 * Values outside of QC limits
 RPD: 0 out of 11 outside limits
 Spike Recovery: 0 out of 22 outside limits
 DO: Surrogate diluted out



TVH-Total Volatile Hydrocarbons

Client: Kleinfelder
Project#: 23-900026
Location: TEAD Lust Sites

Analysis Method: CA LUFT (EPA 8015M)
Prep Method: EPA 5030

Sample #	Client ID	Batch #	Sampled	Extracted	Analyzed	Moisture
129063-001	U3SP041501	33640	04/15/97	04/29/97	04/29/97	21%
129063-003	U3SP041801	33640	04/18/97	04/29/97	04/29/97	7%
129063-004	U3SP041802	33640	04/18/97	04/29/97	04/29/97	8%
129063-005	U3SP041701	33640	04/18/97	04/29/97	04/29/97	1%

Matrix: Soil

Analyte	Units	129063-001	129063-003	129063-004	129063-005
Diln Fac:		1	1	1	1
Gasoline	mg/Kg	<1.3	<1.1	<1.1	<1
Surrogate					
Trifluorotoluene	%REC	53	52	52	53
Bromobenzene	%REC	97	97	95	97



TVH-Total Volatile Hydrocarbons

Client: Kleinfelder

Project#: 23-900026

Location: TEAD Lust Sites

Analysis Method: CA LUFT (EPA 8015M)

Prep Method: EPA 5030

Sample #	Client ID	Batch #	Sampled	Extracted	Analyzed	Moisture
129063-006	U1SP-0421-02	33640	04/21/97	04/29/97	04/29/97	15%
129063-007	U1SP-0422-02	33640	04/22/97	04/29/97	04/29/97	20%

Matrix: Soil

Analyte	Units	129063-006	129063-007
Diln Fac:		1	1
Gasoline	mg/Kg	<1.2	<1.3
Surrogate			
Trifluorotoluene	%REC	52	52
Bromobenzene	%REC	91	96



BTXR

Client: Kleinfelder
Project#: 23-900026
Location: TEAD Lust Sites

Analysis Method: EPA 8020
Prep Method: EPA 5030

Sample #	Client ID	Batch #	Sampled	Extracted	Analyzed	Moisture
129063-006	U1SP-0421-02	33640	04/21/97	04/29/97	04/29/97	15%
129063-007	U1SP-0422-02	33640	04/22/97	04/29/97	04/29/97	20%

Matrix: Soil

Analyte	Units	129063-006	129063-007
Diln Fac:		1	1
Benzene	ug/Kg	<5.9	<6.3
Toluene	ug/Kg	<5.9	<6.3
Ethylbenzene	ug/Kg	<5.9	<6.3
m,p-Xylenes	ug/Kg	<5.9	<6.3
o-Xylene	ug/Kg	<5.9	<6.3
Surrogate			
Trifluorotoluene	%REC	78	79
Bromobenzene	%REC	110	113

Lab #: 129063

BATCH QC REPORT



Curtis & Tompkins, Ltd.
Page 1 of 1

TVH-Total Volatile Hydrocarbons

Client: Kleinfelder
Project#: 23-900026
Location: TRAD Lust Sites

Analysis Method: CA LUFT (EPA 8015M)
Prep Method: EPA 5030

METHOD BLANK

Matrix: Soil
Batch#: 33640
Units: mg/Kg
Diln Fac: 1

Prep Date: 04/29/97
Analysis Date: 04/29/97

MB Lab ID: QC44781

Analyte	Result	
Gasoline	<1.0	
Surrogate	%Rec	Recovery Limits
Trifluorotoluene	56	52-127
Bromobenzene	93	65-135



Lab #: 129063

BATCH QC REPORT

Page 1 of 1

BTXE

Client: Kleinfelder
Project#: 23-900026
Location: TEAD Lust Sites

Analysis Method: EPA 8020
Prep Method: EPA 5030

METHOD BLANK

Matrix: Soil
Batch#: 33640
Units: ug/Kg
Diln Fac: 1

Prep Date: 04/29/97
Analysis Date: 04/29/97

MB Lab ID: QC44781

Analyte	Result	
Benzene	<5.0	
Toluene	<5.0	
Ethylbenzene	<5.0	
m,p-Xylenes	<5.0	
o-Xylene	<5.0	
Surrogate	%Rec	Recovery Limits
Trifluorotoluene	84	52-127
Bromobenzene	109	45-140

Lab #: 129063

BATCH QC REPORT



Curtis & Tompkins, Ltd.

Page 1 of 1

TVH-Total Volatile Hydrocarbons

Client: Kleinfelder
Project#: 23-900026
Location: TEAD Lust Sites

Analysis Method: CA LUFT (EPA 8015M)
Prep Method: EPA 5030

LABORATORY CONTROL SAMPLE

Matrix: Soil
Batch#: 33640
Units: mg/Kg
Diln Fac: 1

Prep Date: 04/29/97
Analysis Date: 04/29/97

LCS Lab ID: QC44779

Analyte	Result	Spike Added	%Rec #	Limits
Gasoline	9.02	10	90	65-135
Surrogate	%Rec	Limits		
Trifluorotoluene	83	52-127		
Bromobenzene	120	65-135		

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

Spike Recovery: 0 out of 1 outside limits



Lab #: 129063

BATCH QC REPORT

BTXE

Client: Kleinfelder
Project#: 23-900026
Location: TEAD Lust Sites

Analysis Method: EPA 8020
Prep Method: EPA 5030

LABORATORY CONTROL SAMPLE

Matrix: Soil
Batch#: 33640
Units: ug/Kg
Diln Fac: 1

Prep Date: 04/29/97
Analysis Date: 04/29/97

LCS Lab ID: QC44780

Analyte	Result	Spike Added	%Rec #	Limits
Benzene	101.3	100	101	80-120
Toluene	102.3	100	102	80-120
Ethylbenzene	103.6	100	104	80-120
m,p-Xylenes	214.6	200	107	80-120
o-Xylene	110.9	100	111	80-120
Surrogate	%Rec	Limits		
Trifluorotoluene	69	52-127		
Bromobenzene	93	45-140		

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

Spike Recovery: 0 out of 5 outside limits

Lab #: 129063

BATCH QC REPORT



Curtis & Tompkins, Ltd.

Page 1 of 1

TVH-Total Volatile Hydrocarbons

Client: Kleinfelder
Project#: 23-900026
Location: TEAD Lust Sites

Analysis Method: CA LUFT (EPA 8015M)
Prep Method: EPA 5030

MATRIX SPIKE/MATRIX SPIKE DUPLICATE

Field ID: ZZZZZZ
Lab ID: 129038-001
Matrix: Soil
Batch#: 33640
Units: mg/Kg
Diln Fac: 1

Sample Date: 04/20/97
Received Date: 04/22/97
Prep Date: 04/29/97
Analysis Date: 04/29/97

MS Lab ID: QC45057

Analyte	Spike Added	Sample	MS	%Rec #	Limits
Gasoline	10	<1	8.29	83	65-135
Surrogate	%Rec	Limits			
Trifluorotoluene	117	52-127			
Bromobenzene	120	65-135			

MSD Lab ID: QC45058

Analyte	Spike Added	MSD	%Rec #	Limits	RPD #	Limit
Gasoline	10	8.68	87	65-135	5	35
Surrogate	%Rec	Limits				
Trifluorotoluene	118	52-127				
Bromobenzene	121	65-135				

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

RPD: 0 out of 1 outside limits

Spike Recovery: 0 out of 2 outside limits



TEH-Tot Ext Hydrocarbons

Client: Kleinfelder
Project#: 23-900026
Location: TEAD Lust Sites

Analysis Method: CA LUFT (EPA 8015M)
Prep Method: CA LUFT

Sample #	Client ID	Batch #	Sampled	Extracted	Analyzed	Moisture
129063-001	U3SP041501	33677	04/15/97	04/28/97	04/30/97	21%
129063-003	U3SP041801	33677	04/18/97	04/28/97	04/30/97	7%
129063-004	U3SP041802	33677	04/18/97	04/28/97	04/30/97	8%
129063-005	U3SP041701	33677	04/18/97	04/28/97	04/30/97	1%

Matrix: Soil

Analyte	Units	129063-001	129063-003	129063-004	129063-005
Diln Fac:		1	1	1	1
Kerosene C10-C16	mg/Kg	<6.3	<5.4	<5.4	<5.1
Diesel C12-C22	mg/Kg	<6.3	<5.4	<5.4	<5.1
Surrogate					
Hexacosane	%REC	75	84	95	81



TEH-Tot Ext Hydrocarbons

Client: Kleinfelder
Project#: 23-900026
Location: TEAD Lust Sites

Analysis Method: CA LUFT (EPA 8015M)
Prep Method: CA LUFT

Sample #	Client ID	Batch #	Sampled	Extracted	Analyzed	Moisture
129063-006	U1SP-0421-02	33677	04/21/97	04/28/97	04/30/97	15%
129063-007	U1SP-0422-02	33677	04/22/97	04/28/97	05/01/97	20%

Matrix: Soil

Analyte	Units	129063-006	129063-007
Diln Fac:		1	1
Kerosene C10-C16	mg/Kg	<5.9	<6.3
Diesel C12-C22	mg/Kg	<5.9	<6.3
Surrogate			
Hexacosane	%REC	95	98

Lab #: 129063

BATCH QC REPORT



Curtis & Tompkins, Ltd.

Page 1 of 1

TEH-Tot Ext Hydrocarbons

Client: Kleinfelder
Project#: 23-900026
Location: TRAD Lust Sites

Analysis Method: CA LUFT (EPA 8015M)
Prep Method: CA LUFT

METHOD BLANK

Matrix: Soil
Batch#: 33677
Units: mg/Kg
Diln Fac: 1

Prep Date: 04/28/97
Analysis Date: 04/30/97

MB Lab ID: QC44912

Analyte	Result	
Kerosene C10-C16	<5.0	
Diesel C12-C22	<5.0	
Surrogate	%Rec	Recovery Limits
Hexacosane	97	65-135

Lab #: 129063

BATCH QC REPORT



Curtis & Tompkins, Ltd.

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TEH-Tot Ext Hydrocarbons

Client: Kleinfelder
Project#: 23-900026
Location: TRAD Lust Sites

Analysis Method: CA LUFT (EPA 8015M)
Prep Method: CA LUFT

LABORATORY CONTROL SAMPLE

Matrix: Soil
Batch#: 33677
Units: mg/Kg
Diln Fac: 1

Prep Date: 04/28/97
Analysis Date: 04/30/97

LCS Lab ID: QC44915

Analyte	Result	Spike Added	%Rec #	Limits
Diesel C12-C22	37.6	49.5	76	65-135
Surrogate	%Rec	Limits		
Hexacosane	96	65-135		

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

Spike Recovery: 0 out of 1 outside limits

Lab #: 129063

BATCH QC REPORT



Curtis & Tompkins, Ltd.

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TEH-Tot Ext Hydrocarbons

Client: Kleinfelder
Project#: 23-900026
Location: TEAD Lust Sites

Analysis Method: CA LUFT (EPA 8015M)
Prep Method: CA LUFT

MATRIX SPIKE/MATRIX SPIKE DUPLICATE

Field ID: U3SP041801
Lab ID: 129063-003
Matrix: Soil
Batch#: 33677
Units: mg/Kg dry weight
Diln Fac: 1

Sample Date: 04/18/97
Received Date: 04/25/97
Prep Date: 04/28/97
Analysis Date: 04/30/97
Moisture: 7%

MS Lab ID: QC44913

Analyte	Spike Added	Sample	MS	%Rec #	Limits
Diesel C12-C22	53.23	<5.376	42.17	71	65-135
Surrogate	%Rec	Limits			
Hexacosane	91	65-135			

MSD Lab ID: QC44914

Analyte	Spike Added	MSD	%Rec #	Limits	RPD #	Limit
Diesel C12-C22	53.23	48.82	84	65-135	15	35
Surrogate	%Rec	Limits				
Hexacosane	102	65-135				

Column to be used to flag recovery and RPD values with an asterisk
* Values outside of QC limits
RPD: 0 out of 1 outside limits
Spike Recovery: 0 out of 2 outside limits



Curtis & Tompkins, Ltd., Analytical Laboratories, Since 1878

2323 Fifth Street, Berkeley, CA 94710. Phone (510) 486-0900

COVER PAGE

Laboratory Number 128926

Kleinfelder
2749 E. Parley's Way
Suite 100
Salt Lake City, UT 84109

Project#: 23-900026
Location: TEAD Lust Sites

Sample ID	Lab ID
U3SP040402	128926-001
U3SP040502	128926-002
U3SP040702	128926-003
U3SP040803	128926-004
U3WQ040301	128926-005
U3WQ040401	128926-006
U3SP040401	128926-007
U3SQ040401	128926-008

I certify that this data package has been reviewed for technical correctness and completeness. Please see attached narrative for a discussion of any analytical problems related to this sample set. Release of this data has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signatures.

Signature: 
Title: Operations Manager

Date: 5/20/97

Signature: 
Title: Project Manager

Date: 5/20/97

Laboratory Number: 128926
Client: Kleinfelder
Project#: 23-900026
Location: TEAD LUST Sites

Sample Date: 04/04-08/97
Receipt Date: 04/10/97

CASE NARRATIVE

This hardcopy data package contains sample and batch QC results for two water and six soil samples received from the above referenced project. The samples were cold and intact. Soil results are reported on a dry-weight basis.

Volatile Organics (EPA 8260): High percent differences (%Ds) were observed for naphthalene in the continuing calibrations performed on April 11, 1997, analytical batch 33413. The high %Ds should not affect the quality of the data as the minimum response criterion for naphthalene was met and naphthalene was not detected in any of the associated samples. No other analytical problems were encountered.

It should be noted that all of the results for sample U3SP040401 (128926-007) were reported from a 1:25 dilution, batch 33486, with the exception of naphthalene. The sample was reanalyzed at a 1:33 dilution, batch 33486, since the result for naphthalene was over the linear range at a 1:25 dilution.

Semivolatile Organics (EPA 8270): Low internal standard areas were observed for perylene-d12 in samples U3SP040402 (128926-001), U3SP040401 (128926-007), and U3SQ040401 (128926-008) due to high concentrations of petroleum hydrocarbons detected in the samples. It should be noted that these samples and sample U3SP040502 (128926-002) were analyzed at dilutions due to the hydrocarbons. Chromatograms for these samples are included with the internal standard reports.

A high response was observed for bis(2-chloroisopropyl)ether in the continuing calibration verification performed on April 17, 1997. The high response should not affect the quality of the data as the minimum response criterion of 0.05 for bis(2-chloroisopropyl) ether was met and the compound was not detected in any of the associated samples.

No other analytical problems were encountered.

TPH Purgeables (EPA 8015M): Low spike recoveries were observed for gasoline in the matrix spike and matrix spike duplicate (MS/MSD) analysis of sample U3SQ040401 (128926-008). The MS/MSD samples were reanalyzed on April 23, 1997 with similar spike recoveries indicating matrix effect. MS/MSD results for the reanalyses are included.

C&T Report# 128926
Case Narrative - page 2

TPH Extractables (EPA 8015M): Surrogate recoveries for samples U3SP040402 (128926-001), U3SP040502 (128926-002), U3SP040401 (128926-007), and U3SQ040401 (128926-008) were not reported as the surrogates were diluted out.

High spike recoveries and relative percent difference (RPD) were observed for diesel in the MS/MSD analysis of sample U3SP040702 (128926-003), batch 33415. The high spike recoveries and RPD may be due to sample nonhomogeneity; spike recovery for the laboratory control sample (LCS) was within the QC limits.

It should be noted that kerosene was quantitated from a single-point calibration standard analyzed at the beginning of each sequence. Subsequent standards were then checked against this first calibration standard.

Iron (EPA 6010A): The spike recovery for iron in the matrix spike analysis of sample U3SP040402 (128926-001) is considered not meaningful (NM), since the sample concentration for iron is greater than four times the spiked level.

General Chemistry: No analytical problems were encountered. The nitrate-N analysis was subcontracted to Clayton Environmental Consultants.

NAME	DATE	TIME	FROM	TO	REMARKS
M-50					
Sam					
Can					
Ship					

Temp 131dg 137~



Curtis & Tompkins, Inc.

COOLER RECEIPT CHECKLIST

Login#: 128926 Date Received: 4/10 Number of Coolers: 1
Client: Klein SLC Project: _____

A. Preliminary Examination Phase

Date Opened: 4/10 By (print): J. Williams (sign) J. Williams

1. Did cooler come with a shipping slip (airbill, etc.)? YES NO

If YES, enter carrier name and airbill number: Fed ex 387310824

2. Were custody seals on outside of cooler? YES NO

How many and where? 2 seals Seal date: _____ Seal name: _____

3. Were custody seals unbroken and intact at the date and time of arrival? YES NO

* 4. Were custody papers dry and intact when received? YES NO

5. Were custody papers filled out properly (ink, signed, etc.)? YES NO N/A

6. Did you sign the custody papers in the appropriate place? YES NO N/A

7. Was project identifiable from custody papers? YES NO N/A

If YES, enter project name at the top of this form.

8. If required, was sufficient ice used? YES NO

Type of ice: blue / white Temperature: 5.0°C

B. Login Phase

Date Logged In: 4/10 By (print): J. Williams (sign) J. Williams

1. Describe type of packing in cooler: bubble wrap

2. Did all bottles arrive unbroken? YES NO

3. Were labels in good condition and complete (ID, date, time, signature, etc.)? YES NO

4. Did bottle labels agree with custody papers? YES NO

5. Were appropriate containers used for the tests indicated? YES NO

6. Were correct preservatives added to samples? YES NO

7. Was sufficient amount of sample sent for tests indicated? YES NO

8. Were bubbles absent in VOA samples? If NO, list sample IDs below YES NO

9. Was the client contacted concerning this sample delivery? YES NO

If YES, give details below.

Who was called? _____ By whom? _____ Date: _____

Additional Comments:

14- No Custody Papers arrived with Samples

17 Custody Papers faxed 2:30pm 4/10/07 J. Williams

STUDY SEAL

4-9-97

Signature Daniel J. Williams

Curtis & Tompkins, Ltd.
Analytical Laboratories, Since 1878
2323 Fifth Street
Berkeley, CA 94710
(510)486-0900 ph
(510)486-0532 fx

9704137

Project Number: 128926

Subcontract Lab:

Clayton Environmental
1252 Quarry Lane
Pleasanton, CA 94566
(510) 426-2600

Please send report to: Anh Du

Turnaround Time: Normal (5day)

Sample ID	Date Sampled	Matrix	Analysis	C&T Lab #
U3SP040402	04-APR-97	Soil	NITRATE <i>glow mel jar</i>	128926-001

***Please report using Sample ID instead of C&T Lab #.

Notes:	RELINQUISHED BY:	RECEIVED BY:
	<i>[Signature]</i> 4/11/97 Date/Time	<i>[Signature]</i> 4/11/97 12:45 Date/Time
	<i>[Signature]</i> 4/11/97 12:15 Date/Time	<i>Carol Hammerberg</i> 4/11/97 12:45 Date/Time <i>Ridin good condition / cool</i>

Signature on this form constitutes a firm Purchase Order for the services requested above.

Percent Moisture Summary Report

Date: 16-APR-97
Batch: 33484
Analyst: DRH

Sample	Method	Date	Tare(g)	Wet(g)	Dry(g)	Percent Solids	Percent Moisture
128926-001	CLP SOW 390	16-APR-97	15.8702	22.3333	20.8678	77	23
128926-002	CLP SOW 390	16-APR-97	15.9248	21.2011	20.2676	82	18
128926-003	CLP SOW 390	16-APR-97	15.931	21.4688	21.2464	96	4
128926-004	CLP SOW 390	16-APR-97	15.3066	21.7634	21.4367	95	5
128926-007	CLP SOW 390	16-APR-97	15.0149	21.7696	20.6537	83	17
128926-008	CLP SOW 390	16-APR-97	14.9927	22.0689	20.8838	83	17
128959-001	CLP SOW 390	16-APR-97	15.3576	21.0375	19.8253	79	21
128960-005	CLP SOW 390	16-APR-97	15.0393	21.5546	20.2946	81	19
128960-010	CLP SOW 390	16-APR-97	15.6752	21.531	20.3651	80	20
128960-015	CLP SOW 390	16-APR-97	15.9713	21.5236	20.7605	86	14
128960-020	CLP SOW 390	16-APR-97	15.807	21.6165	20.5153	81	19
128962-001	CLP SOW 390	16-APR-97	15.2448	21.1701	17.781	43	57
128962-002	CLP SOW 390	16-APR-97	15.7015	21.8189	18.1643	40	60
128962-003	CLP SOW 390	16-APR-97	15.7949	21.1672	17.8263	38	62
QC44188	CLP SOW 390	16-APR-97	15.1811	21.1819	17.4478	38	62
of 128962-003						RPD: 0.1%	0.1%



Volatile Organics by GC/MS		
Client: Kleinfelder	Analysis Method: EPA 8260	
Project#: 23-900026	Prep Method: EPA 5030	
Location: TEAD Lust Sites		
Field ID: U3SP040402	Sampled: 04/04/97	
Lab ID: 128926-001	Received: 04/10/97	
Matrix: Soil	Extracted: 04/17/97	
Batch#: 33486	Analyzed: 04/17/97	
Units: ug/Kg dry weight	Moisture: 23%	
Diln Fac: 33.33		
Analyte	Result	Reporting Limit
Chloromethane	ND	2200
Bromomethane	ND	2200
Vinyl Chloride	ND	2200
Chloroethane	ND	2200
Methylene Chloride	ND	430
Acetone	ND	430
Carbon Disulfide	ND	4300
Trichlorofluoromethane	ND	430
1,1-Dichloroethene	ND	430
1,1-Dichloroethane	ND	430
trans-1,2-Dichloroethene	ND	220
cis-1,2-Dichloroethene	ND	220
Chloroform	ND	430
1,2-Dichloroethane	ND	430
2-Butanone	ND	4300
1,1,1-Trichloroethane	ND	430
Carbon Tetrachloride	ND	430
Vinyl Acetate	ND	4300
Bromodichloromethane	ND	430
Dibromomethane	ND	430
1,2-Dichloropropane	ND	430
cis-1,3-Dichloropropene	ND	430
Trichloroethene	ND	430
Dibromochloromethane	ND	2200
1,1,2-Trichloroethane	ND	430
Benzene	120 J	430
trans-1,3-Dichloropropene	ND	430
Bromoform	ND	430
2-Hexanone	ND	4300
4-Methyl-2-Pentanone	ND	4300
1,1,2,2-Tetrachloroethane	ND	430
Tetrachloroethene	ND	430
Toluene	500	430
Chlorobenzene	ND	430
Ethylbenzene	760	430
Styrene	ND	430
m,p-Xylenes	2300	220
o-Xylene	740	220
1,2,3-Trichloropropane	ND	430
1,3-Dichlorobenzene	ND	430
1,4-Dichlorobenzene	ND	430
1,2-Dichlorobenzene	ND	430
Naphthalene	4900	2200
Surrogate	%Recovery	Recovery Limits
Toluene-d8	100	84-138
Bromofluorobenzene	111	59-113
1,2-Dichloroethane-d4	94	76-114

J: Estimated Value



Volatile Organics by GC/MS

Client: Kleinfelder
Project#: 23-900026
Location: TEAD Lust Sites

Analysis Method: EPA 8260
Prep Method: EPA 5030

Field ID: U3SP040502
Lab ID: 128926-002
Matrix: Soil
Batch#: 33486
Units: ug/Kg dry weight
Diln Fac: 25

Sampled: 04/05/97
Received: 04/10/97
Extracted: 04/17/97
Analyzed: 04/17/97
Moisture: 18%

Analyte	Result	Reporting Limit
Chloromethane	ND	1500
Bromomethane	ND	1500
Vinyl Chloride	ND	1500
Chloroethane	ND	1500
Methylene Chloride	ND	300
Acetone	ND	300
Carbon Disulfide	ND	3000
Trichlorofluoromethane	ND	300
1,1-Dichloroethene	ND	300
1,1-Dichloroethane	ND	300
trans-1,2-Dichloroethene	ND	150
cis-1,2-Dichloroethene	ND	150
Chloroform	ND	300
1,2-Dichloroethane	ND	300
2-Butanone	ND	3000
1,1,1-Trichloroethane	ND	300
Carbon Tetrachloride	ND	300
Vinyl Acetate	ND	3000
Bromodichloromethane	ND	300
Dibromomethane	ND	300
1,2-Dichloropropane	ND	300
cis-1,3-Dichloropropene	ND	300
Trichloroethene	ND	300
Dibromochloromethane	ND	1500
1,1,2-Trichloroethane	ND	300
Benzene	ND	300
trans-1,3-Dichloropropene	ND	300
Bromoform	ND	300
2-Hexanone	ND	3000
4-Methyl-2-Pentanone	ND	3000
1,1,2,2-Tetrachloroethane	ND	300
Tetrachloroethene	ND	300
Toluene	ND	300
Chlorobenzene	ND	300
Ethylbenzene	170 J	300
Styrene	ND	300
m,p-Xylenes	490	150
o-Xylene	ND	150
1,2,3-Trichloropropane	ND	300
1,3-Dichlorobenzene	ND	300
1,4-Dichlorobenzene	ND	300
1,2-Dichlorobenzene	ND	300
Naphthalene	6000	1500
Surrogate	%Recovery	Recovery Limits
Toluene-d8	99	84-138
Bromofluorobenzene	111	59-113
1,2-Dichloroethane-d4	95	76-114

J: Estimated Value



Volatile Organics by GC/MS

Client: Kleinfelder
Project#: 23-900026
Location: TEAD Lust Sites

Analysis Method: EPA 8260
Prep Method: EPA 5030

Field ID: U3SP040702
Lab ID: 128926-003
Matrix: Soil
Batch#: 33413
Units: ug/Kg dry weight
Diln Fac: 1

Sampled: 04/07/97
Received: 04/10/97
Extracted: 04/12/97
Analyzed: 04/12/97
Moisture: 4%

Analyte	Result	Reporting Limit
Chloromethane	ND	52
Bromomethane	ND	52
Vinyl Chloride	ND	52
Chloroethane	ND	52
Methylene Chloride	ND	10
Acetone	12	10
Carbon Disulfide	ND	100
Trichlorofluoromethane	ND	10
1,1-Dichloroethene	ND	10
1,1-Dichloroethane	ND	10
trans-1,2-Dichloroethene	ND	5.2
cis-1,2-Dichloroethene	ND	5.2
Chloroform	ND	10
1,2-Dichloroethane	ND	10
2-Butanone	ND	100
1,1,1-Trichloroethane	ND	10
Carbon Tetrachloride	ND	10
Vinyl Acetate	ND	100
Bromodichloromethane	ND	10
Dibromomethane	ND	10
1,2-Dichloropropane	ND	10
cis-1,3-Dichloropropene	ND	10
Trichloroethene	ND	10
Dibromochloromethane	ND	52
1,1,2-Trichloroethane	ND	10
Benzene	ND	10
trans-1,3-Dichloropropene	ND	10
Bromoform	ND	10
2-Hexanone	ND	100
4-Methyl-2-Pentanone	ND	100
1,1,2,2-Tetrachloroethane	ND	10
Tetrachloroethene	ND	10
Toluene	ND	10
Chlorobenzene	ND	10
Ethylbenzene	ND	10
Styrene	ND	10
m,p-Xylenes	ND	5.2
o-Xylene	ND	5.2
1,2,3-Trichloropropane	ND	10
1,3-Dichlorobenzene	ND	10
1,4-Dichlorobenzene	ND	10
1,2-Dichlorobenzene	ND	10
Naphthalene	ND	52
Surrogate	%Recovery	Recovery Limits
Toluene-d8	98	84-138
Bromofluorobenzene	97	59-113
1,2-Dichloroethane-d4	94	76-114



Volatile Organics by GC/MS

Client: Kleinfelder
Project#: 23-900026
Location: TEAD Lust Sites

Analysis Method: EPA 8260
Prep Method: EPA 5030

Field ID: U3SP040803
Lab ID: 128926-004
Matrix: Soil
Batch#: 33413
Units: ug/Kg dry weight
Diln Fac: 1

Sampled: 04/08/97
Received: 04/10/97
Extracted: 04/12/97
Analyzed: 04/12/97
Moisture: 5%

Analyte	Result	Reporting Limit
Chloromethane	ND	53
Bromomethane	ND	53
Vinyl Chloride	ND	53
Chloroethane	ND	53
Methylene Chloride	ND	11
Acetone	31	11
Carbon Disulfide	ND	110
Trichlorofluoromethane	ND	11
1,1-Dichloroethene	ND	11
1,1-Dichloroethane	ND	11
trans-1,2-Dichloroethene	ND	5.3
cis-1,2-Dichloroethene	ND	5.3
Chloroform	ND	11
1,2-Dichloroethane	ND	11
2-Butanone	ND	110
1,1,1-Trichloroethane	ND	11
Carbon Tetrachloride	ND	11
Vinyl Acetate	ND	110
Bromodichloromethane	ND	11
Dibromomethane	ND	11
1,2-Dichloropropane	ND	11
cis-1,3-Dichloropropene	ND	11
Trichloroethene	ND	11
Dibromochloromethane	ND	53
1,1,2-Trichloroethane	ND	11
Benzene	ND	11
trans-1,3-Dichloropropene	ND	11
Bromoform	ND	11
2-Hexanone	ND	110
4-Methyl-2-Pentanone	ND	110
1,1,2,2-Tetrachloroethane	ND	11
Tetrachloroethene	ND	11
Toluene	ND	11
Chlorobenzene	ND	11
Ethylbenzene	ND	11
Styrene	ND	11
m,p-Xylenes	ND	5.3
o-Xylene	ND	5.3
1,2,3-Trichloropropane	ND	11
1,3-Dichlorobenzene	ND	11
1,4-Dichlorobenzene	ND	11
1,2-Dichlorobenzene	ND	11
Naphthalene	ND	53
Surrogate	%Recovery	Recovery Limits
Toluene-d8	99	84-138
Bromofluorobenzene	98	59-113
1,2-Dichloroethane-d4	96	76-114



Volatile Organics by GC/MS		
Client: Kleinfelder	Analysis Method: EPA 8260	
Project#: 23-900026	Prep Method: EPA 5030	
Location: TRAD Lust Sites		
Field ID: U3WQ040301	Sampled: 04/03/97	
Lab ID: 128926-005	Received: 04/10/97	
Matrix: Water	Extracted: 04/11/97	
Batch#: 33410	Analyzed: 04/11/97	
Units: ug/L		
Diln Fac: 1		
Analyte	Result	Reporting Limit
Chloromethane	ND	10
Bromomethane	ND	10
Vinyl Chloride	ND	10
Chloroethane	ND	10
Methylene Chloride	ND	10
Acetone	ND	50
Carbon Disulfide	ND	50
Trichlorofluoromethane	ND	5.0
1,1-Dichloroethene	ND	5.0
1,1-Dichloroethane	ND	5.0
trans-1,2-Dichloroethene	ND	5.0
cis-1,2-Dichloroethene	ND	5.0
Chloroform	ND	5.0
1,2-Dichloroethane	ND	5.0
2-Butanone	ND	50
1,1,1-Trichloroethane	ND	5.0
Carbon Tetrachloride	ND	5.0
Vinyl Acetate	ND	50
Bromodichloromethane	ND	5.0
Dibromomethane	ND	5.0
1,2-Dichloropropane	ND	5.0
cis-1,3-Dichloropropene	ND	5.0
Trichloroethene	ND	5.0
Dibromochloromethane	ND	50
1,1,2-Trichloroethane	ND	5.0
Benzene	ND	5.0
trans-1,3-Dichloropropene	ND	5.0
Bromoform	ND	5.0
2-Hexanone	ND	50
4-Methyl-2-Pentanone	ND	50
1,1,2,2-Tetrachloroethane	ND	5.0
Tetrachloroethene	ND	5.0
Toluene	ND	5.0
Chlorobenzene	ND	5.0
Ethylbenzene	ND	5.0
Styrene	ND	5.0
m,p-Xylenes	ND	5.0
o-Xylene	ND	5.0
1,2,3-Trichloropropane	ND	5.0
1,3-Dichlorobenzene	ND	5.0
1,4-Dichlorobenzene	ND	5.0
1,2-Dichlorobenzene	ND	5.0
Naphthalene	ND	10
Surrogate	%Recovery	Recovery Limits
1,2-Dichloroethane-d4	111	76-114
Toluene-d8	98	84-138
Bromofluorobenzene	102	59-113



Volatile Organics by GC/MS

Client: Kleinfelder
Project#: 23-900026
Location: TRAD Lust Sites

Analysis Method: EPA 8260
Prep Method: EPA 5030

Field ID: U3WQ040401
Lab ID: 128926-006
Matrix: Water
Batch#: 33410
Units: ug/L
Diln Fac: 1

Sampled: 04/04/97
Received: 04/10/97
Extracted: 04/11/97
Analyzed: 04/11/97

Analyte	Result	Reporting Limit
Chloromethane	ND	10
Bromomethane	ND	10
Vinyl Chloride	ND	10
Chloroethane	ND	10
Methylene Chloride	ND	10
Acetone	ND	10
Carbon Disulfide	ND	10
Trichlorofluoromethane	ND	50
1,1-Dichloroethene	ND	5.0
1,1-Dichloroethane	ND	5.0
trans-1,2-Dichloroethene	ND	5.0
cis-1,2-Dichloroethene	ND	5.0
Chloroform	ND	5.0
1,2-Dichloroethane	ND	5.0
2-Butanone	ND	5.0
1,1,1-Trichloroethane	ND	10
Carbon Tetrachloride	ND	5.0
Vinyl Acetate	ND	5.0
Bromodichloromethane	ND	50
Dibromomethane	ND	5.0
1,2-Dichloropropane	ND	5.0
cis-1,3-Dichloropropene	ND	5.0
Trichloroethene	ND	5.0
Dibromochloromethane	ND	5.0
1,1,2-Trichloroethane	ND	50
Benzene	ND	5.0
trans-1,3-Dichloropropene	ND	5.0
Bromoform	ND	5.0
2-Hexanone	ND	5.0
4-Methyl-2-Pentanone	ND	50
1,1,2,2-Tetrachloroethane	ND	50
Tetrachloroethene	ND	5.0
Toluene	ND	5.0
Chlorobenzene	ND	5.0
Ethylbenzene	ND	5.0
Styrene	ND	5.0
m,p-Xylenes	ND	5.0
o-Xylene	ND	5.0
1,2,3-Trichloropropane	ND	5.0
1,3-Dichlorobenzene	ND	5.0
1,4-Dichlorobenzene	ND	5.0
1,2-Dichlorobenzene	ND	5.0
Naphthalene	ND	5.0
		10
Surrogate	%Recovery	Recovery Limits
1,2-Dichloroethane-d4	109	68-126
Toluene-d8	101	87-125
Bromofluorobenzene	102	79-122



Volatile Organics by GC/MS		
Client: Kleinfelder	Analysis Method: EPA 8260	
Project#: 23-900026	Prep Method: EPA 5030	
Location: TEAD Lust Sites		
Field ID: U3SP040401	Sampled: 04/04/97	
Lab ID: 128926-007	Received: 04/10/97	
Matrix: Soil	Extracted: 04/17/97	
Batch#: 33486	Analyzed: 04/17/97	
Units: ug/Kg dry weight	Moisture: 17%	
Diln Fac: 25		
Analyte	Result	Reporting Limit
Chloromethane	ND	1500
Bromomethane	ND	1500
Vinyl Chloride	ND	1500
Chloroethane	ND	1500
Methylene Chloride	ND	300
Acetone	ND	300
Carbon Disulfide	ND	3000
Trichlorofluoromethane	ND	300
1,1-Dichloroethene	ND	300
1,1-Dichloroethane	ND	300
trans-1,2-Dichloroethene	ND	150
cis-1,2-Dichloroethene	150	150
Chloroform	ND	300
1,2-Dichloroethane	ND	300
2-Butanone	ND	3000
1,1,1-Trichloroethane	ND	300
Carbon Tetrachloride	ND	300
Vinyl Acetate	ND	3000
Bromodichloromethane	ND	300
Dibromomethane	ND	300
1,2-Dichloropropane	ND	300
cis-1,3-Dichloropropene	ND	300
Trichloroethene	ND	300
Dibromochloromethane	ND	1500
1,1,2-Trichloroethane	ND	300
Benzene	ND	300
trans-1,3-Dichloropropene	ND	300
Bromoform	ND	300
2-Hexanone	ND	3000
4-Methyl-2-Pentanone	ND	3000
1,1,2,2-Tetrachloroethane	ND	300
Tetrachloroethene	ND	300
Toluene	190 J	300
Chlorobenzene	ND	300
Ethylbenzene	470	300
Styrene	ND	300
m,p-Xylenes	820	150
o-Xylene	330	150
1,2,3-Trichloropropane	ND	300
1,3-Dichlorobenzene	ND	300
1,4-Dichlorobenzene	ND	300
1,2-Dichlorobenzene	ND	300
Naphthalene	3400	2000
Surrogate	%Recovery	Recovery Limits
Toluene-d8	102	84-138
Bromofluorobenzene	109	59-113
1,2-Dichloroethane-d4	95	76-114

J: Estimated Value



Volatile Organics by GC/MS

Client: Kleinfelder
 Project#: 23-900026
 Location: TEAD Lust Sites

Analysis Method: EPA 8260
 Prep Method: EPA 5030

Field ID: U3SQ040401
 Lab ID: 128926-008
 Matrix: Soil
 Batch#: 33486
 Units: ug/Kg dry weight
 Diln Fac: 25

Sampled: 04/04/97
 Received: 04/10/97
 Extracted: 04/17/97
 Analyzed: 04/17/97
 Moisture: 17%

Analyte	Result	Reporting Limit
Chloromethane	ND	1500
Bromomethane	ND	1500
Vinyl Chloride	ND	1500
Chloroethane	ND	1500
Methylene Chloride	ND	300
Acetone	ND	300
Carbon Disulfide	ND	3000
Trichlorofluoromethane	ND	300
1,1-Dichloroethene	ND	300
1,1-Dichloroethane	ND	300
trans-1,2-Dichloroethene	ND	150
cis-1,2-Dichloroethene	ND	150
Chloroform	ND	300
1,2-Dichloroethane	ND	300
2-Butanone	ND	3000
1,1,1-Trichloroethane	ND	300
Carbon Tetrachloride	ND	300
Vinyl Acetate	ND	3000
Bromodichloromethane	ND	300
Dibromomethane	ND	300
1,2-Dichloropropane	ND	300
cis-1,3-Dichloropropene	ND	300
Trichloroethene	ND	300
Dibromochloromethane	ND	1500
1,1,2-Trichloroethane	ND	300
Benzene	ND	300
trans-1,3-Dichloropropene	ND	300
Bromoform	ND	300
2-Hexanone	ND	3000
4-Methyl-2-Pentanone	ND	3000
1,1,2,2-Tetrachloroethane	ND	300
Tetrachloroethene	ND	300
Toluene	ND	300
Chlorobenzene	ND	300
Ethylbenzene	ND	300
Styrene	ND	300
m,p-Xylenes	420	150
o-Xylene	130 J	150
1,2,3-Trichloropropane	ND	300
1,3-Dichlorobenzene	ND	300
1,4-Dichlorobenzene	ND	300
1,2-Dichlorobenzene	ND	300
Naphthalene	950 J	1500
Surrogate	%Recovery	Recovery Limits
Toluene-d8	101	84-138
Bromofluorobenzene	106	59-113
1,2-Dichloroethane-d4	96	76-114

J: Estimated Value



Lab #: 128926

BATCH QC REPORT

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EPA 8260 Volatile Organics

Client: Kleinfelder
Project#: 23-900026
Location: TRAD Lust Sites

Analysis Method: EPA 8260
Prep Method: EPA 5030

METHOD BLANK

Matrix: Water
Batch#: 33410
Units: ug/L
Diln Fac: 1

Prep Date: 04/11/97
Analysis Date: 04/11/97

MB Lab ID: QC43883

Analyte	Result	Reporting Limit
Chloromethane	ND	10
Bromomethane	ND	10
Vinyl Chloride	ND	10
Chloroethane	ND	10
Methylene Chloride	ND	10
Acetone	ND	50
Carbon Disulfide	ND	50
Trichlorofluoromethane	ND	5.0
1,1-Dichloroethene	ND	5.0
1,1-Dichloroethane	ND	5.0
trans-1,2-Dichloroethene	ND	5.0
cis-1,2-Dichloroethene	ND	5.0
Chloroform	ND	5.0
1,2-Dichloroethane	ND	5.0
2-Butanone	ND	50
1,1,1-Trichloroethane	ND	5.0
Carbon Tetrachloride	ND	5.0
Vinyl Acetate	ND	50
Bromodichloromethane	ND	5.0
Dibromomethane	ND	5.0
1,2-Dichloropropane	ND	5.0
cis-1,3-Dichloropropene	ND	5.0
Trichloroethene	ND	5.0
Dibromochloromethane	ND	50
1,1,2-Trichloroethane	ND	5.0
Benzene	ND	5.0
trans-1,3-Dichloropropene	ND	5.0
Bromoform	ND	5.0
2-Hexanone	ND	50
4-Methyl-2-Pentanone	ND	50
1,1,2,2-Tetrachloroethane	ND	5.0
Tetrachloroethene	ND	5.0
Toluene	ND	5.0
Chlorobenzene	ND	5.0
Ethylbenzene	ND	5.0
Styrene	ND	5.0
m,p-Xylenes	ND	5.0
o-Xylene	ND	5.0

Lab #: 128926

BATCH QC REPORT



Curtis & Tompkins, Ltd.

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EPA 8260 Volatile Organics

Client: Kleinfelder
Project#: 23-900026
Location: TEAD Lust Sites

Analysis Method: EPA 8260
Prep Method: EPA 5030

METHOD BLANK

Matrix: Water
Batch#: 33410
Units: ug/L
Diln Fac: 1

Prep Date: 04/11/97
Analysis Date: 04/11/97

MB Lab ID: QC43883

Analyte	Result	Reporting Limit
1,2,3-Trichloropropane	ND	5.0
1,3-Dichlorobenzene	ND	5.0
1,4-Dichlorobenzene	ND	5.0
1,2-Dichlorobenzene	ND	5.0
Naphthalene	ND	10
Surrogate	%Rec	Recovery Limits
1,2-Dichloroethane-d4	102	76-114
Toluene-d8	98	88-110
Bromofluorobenzene	100	86-115
Dibromofluoromethane	109	76-114



Lab #: 128926

BATCH QC REPORT

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EPA 8260 Volatile Organics

Client: Kleinfelder
Project#: 23-900026
Location: TEAD Lust Sites

Analysis Method: EPA 8260
Prep Method: EPA 5030

METHOD BLANK

Matrix: Soil
Batch#: 33413
Units: ug/Kg
Diln Fac: 1

Prep Date: 04/11/97
Analysis Date: 04/11/97

MB Lab ID: QC43897

Analyte	Result	Reporting Limit
Chloromethane	ND	50
Bromomethane	ND	50
Vinyl Chloride	ND	50
Chloroethane	ND	50
Methylene Chloride	ND	10
Acetone	ND	10
Carbon Disulfide	ND	100
Trichlorofluoromethane	ND	10
1,1-Dichloroethene	ND	10
1,1-Dichloroethane	ND	10
trans-1,2-Dichloroethene	ND	5.0
cis-1,2-Dichloroethene	ND	5.0
Chloroform	ND	10
1,2-Dichloroethane	ND	10
2-Butanone	ND	100
1,1,1-Trichloroethane	ND	10
Carbon Tetrachloride	ND	10
Vinyl Acetate	ND	100
Bromodichloromethane	ND	10
Dibromomethane	ND	10
1,2-Dichloropropane	ND	10
cis-1,3-Dichloropropene	ND	10
Trichloroethene	ND	10
Dibromochloromethane	ND	50
1,1,2-Trichloroethane	ND	10
Benzene	ND	10
trans-1,3-Dichloropropene	ND	10
Bromoform	ND	10
2-Hexanone	ND	100
4-Methyl-2-Pentanone	ND	100
1,1,2,2-Tetrachloroethane	ND	10
Tetrachloroethene	ND	10
Toluene	ND	10
Chlorobenzene	ND	10
Ethylbenzene	ND	10
Styrene	ND	10
m,p-Xylenes	ND	5.0
o-Xylene	ND	5.0

Lab #: 128926

BATCH QC REPORT



Curtis & Tompkins, Ltd.

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EPA 8260 Volatile Organics

Client: Kleinfelder
Project#: 23-900026
Location: TEAD Lust Sites

Analysis Method: EPA 8260
Prep Method: EPA 5030

METHOD BLANK

Matrix: Soil
Batch#: 33413
Units: ug/Kg
Diln Fac: 1

Prep Date: 04/11/97
Analysis Date: 04/11/97

MB Lab ID: QC43897

Analyte	Result	Reporting Limit
1,2,3-Trichloropropane	ND	10
1,3-Dichlorobenzene	ND	10
1,4-Dichlorobenzene	ND	10
1,2-Dichlorobenzene	ND	10
Naphthalene	ND	50
Surrogate	%Rec	Recovery Limits
Toluene-d8	96	84-138
Bromofluorobenzene	101	59-113
Dibromofluoromethane	109	70-121
1,2-Dichloroethane-d4	104	70-121



Lab #: 128926

BATCH QC REPORT

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EPA 8260 Volatile Organics

Client: Kleinfelder
Project#: 23-900026
Location: TRAD Lust Sites

Analysis Method: EPA 8260
Prep Method: EPA 5030

METHOD BLANK

Matrix: Soil
Batch#: 33413
Units: ug/Kg
Diln Fac: 1

Prep Date: 04/11/97
Analysis Date: 04/11/97

MB Lab ID: QC43908

Analyte	Result	Reporting Limit
Chloromethane	ND	50
Bromomethane	ND	50
Vinyl Chloride	ND	50
Chloroethane	ND	50
Methylene Chloride	ND	10
Acetone	ND	10
Carbon Disulfide	ND	100
Trichlorofluoromethane	ND	10
1,1-Dichloroethene	ND	10
1,1-Dichloroethane	ND	10
trans-1,2-Dichloroethene	ND	5.0
cis-1,2-Dichloroethene	ND	5.0
Chloroform	ND	10
1,2-Dichloroethane	ND	10
2-Butanone	ND	100
1,1,1-Trichloroethane	ND	10
Carbon Tetrachloride	ND	10
Vinyl Acetate	ND	100
Bromodichloromethane	ND	10
Dibromomethane	ND	10
1,2-Dichloropropane	ND	10
cis-1,3-Dichloropropene	ND	10
Trichloroethene	ND	10
Dibromochloromethane	ND	50
1,1,2-Trichloroethane	ND	10
Benzene	ND	10
trans-1,3-Dichloropropene	ND	10
Bromoform	ND	10
2-Hexanone	ND	100
4-Methyl-2-Pentanone	ND	100
1,1,2,2-Tetrachloroethane	ND	10
Tetrachloroethene	ND	10
Toluene	ND	10
Chlorobenzene	ND	10
Ethylbenzene	ND	10
Styrene	ND	10
m,p-Xylenes	ND	5.0
o-Xylene	ND	5.0

Lab #: 128926

BATCH QC REPORT

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EPA 8260 Volatile Organics

Client: Kleinfelder
Project#: 23-900026
Location: TEAD Lust Sites

Analysis Method: EPA 8260
Prep Method: EPA 5030

METHOD BLANK

Matrix: Soil
Batch#: 33413
Units: ug/Kg
Diln Fac: 1

Prep Date: 04/11/97
Analysis Date: 04/11/97

MB Lab ID: QC43908

Analyte	Result	Reporting Limit
1,2,3-Trichloropropane	ND	10
1,3-Dichlorobenzene	ND	10
1,4-Dichlorobenzene	ND	10
1,2-Dichlorobenzene	ND	10
Naphthalene	ND	50
Surrogate	%Rec	Recovery Limits
Toluene-d8	100	84-138
Bromofluorobenzene	99	59-113
Dibromofluoromethane	108	70-121
1,2-Dichloroethane-d4	104	70-121



Lab #: 128926

BATCH QC REPORT

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EPA 8260 Volatile Organics

Client: Kleinfelder
Project#: 23-900026
Location: TRAD Lust Sites

Analysis Method: EPA 8260
Prep Method: EPA 5030

METHOD BLANK

Matrix: Water
Batch#: 33486
Units: ug/L
Diln Fac: 1

Prep Date: 04/16/97
Analysis Date: 04/16/97

MB Lab ID: QC44194

Analyte	Result	Reporting Limit
Chloromethane	ND	10
Bromomethane	ND	10
Vinyl Chloride	ND	10
Chloroethane	ND	10
Methylene Chloride	ND	10
Acetone	ND	50
Carbon Disulfide	ND	50
Trichlorofluoromethane	ND	5.0
1,1-Dichloroethene	ND	5.0
1,1-Dichloroethane	ND	5.0
trans-1,2-Dichloroethene	ND	5.0
cis-1,2-Dichloroethene	ND	5.0
Chloroform	ND	5.0
1,2-Dichloroethane	ND	5.0
2-Butanone	ND	50
1,1,1-Trichloroethane	ND	5.0
Carbon Tetrachloride	ND	5.0
Vinyl Acetate	ND	50
Bromodichloromethane	ND	5.0
Dibromomethane	ND	5.0
1,2-Dichloropropane	ND	5.0
cis-1,3-Dichloropropene	ND	5.0
Trichloroethene	ND	5.0
Dibromochloromethane	ND	50
1,1,2-Trichloroethane	ND	5.0
Benzene	ND	5.0
trans-1,3-Dichloropropene	ND	5.0
Bromoform	ND	5.0
2-Hexanone	ND	50
4-Methyl-2-Pentanone	ND	50
1,1,2,2-Tetrachloroethane	ND	5.0
Tetrachloroethene	ND	5.0
Toluene	ND	5.0
Chlorobenzene	ND	5.0
Ethylbenzene	ND	5.0
Styrene	ND	5.0
m,p-Xylenes	ND	5.0
o-Xylene	ND	5.0



Lab #: 128926

BATCH QC REPORT

Page 2 of 2

EPA 8260 Volatile Organics

Client: Kleinfelder
Project#: 23-900026
Location: TEAD Lust Sites

Analysis Method: EPA 8260
Prep Method: EPA 5030

METHOD BLANK

Matrix: Water
Batch#: 33486
Units: ug/L
Diln Fac: 1

Prep Date: 04/16/97
Analysis Date: 04/16/97

MB Lab ID: QC44194

Analyte	Result	Reporting Limit
1,2,3-Trichloropropane	ND	5.0
1,3-Dichlorobenzene	ND	5.0
1,4-Dichlorobenzene	ND	5.0
1,2-Dichlorobenzene	ND	5.0
Naphthalene	ND	10
Surrogate	%Rec	Recovery Limits
1,2-Dichloroethane-d4	103	76-114
Toluene-d8	103	88-110
Bromofluorobenzene	106	86-115
Dibromofluoromethane	102	76-114

Lab #: 128926

BATCH QC REPORT



Curtis & Tompkins, Ltd

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EPA 8260 Volatile Organics

Client: Kleinfelder
 Project#: 23-900026
 Location: TRAD Lust Sites

Analysis Method: EPA 8260
 Prep Method: EPA 5030

METHOD BLANK

Matrix: Water
 Batch#: 33486
 Units: ug/L
 Diln Fac: 1

Prep Date: 04/16/97
 Analysis Date: 04/16/97

MB Lab ID: QC44225

Analyte	Result	Reporting Limit
Chloromethane	ND	10
Bromomethane	ND	10
Vinyl Chloride	ND	10
Chloroethane	ND	10
Methylene Chloride	ND	10
Acetone	ND	50
Carbon Disulfide	ND	50
Trichlorofluoromethane	ND	5.0
1,1-Dichloroethene	ND	5.0
1,1-Dichloroethane	ND	5.0
trans-1,2-Dichloroethene	ND	5.0
cis-1,2-Dichloroethene	ND	5.0
Chloroform	ND	5.0
1,2-Dichloroethane	ND	5.0
2-Butanone	ND	50
1,1,1-Trichloroethane	ND	5.0
Carbon Tetrachloride	ND	5.0
Vinyl Acetate	ND	50
Bromodichloromethane	ND	5.0
Dibromomethane	ND	5.0
1,2-Dichloropropane	ND	5.0
cis-1,3-Dichloropropene	ND	5.0
Trichloroethene	ND	5.0
Dibromochloromethane	ND	50
1,1,2-Trichloroethane	ND	5.0
Benzene	ND	5.0
trans-1,3-Dichloropropene	ND	5.0
Bromoform	ND	5.0
2-Hexanone	ND	5.0
4-Methyl-2-Pentanone	ND	50
1,1,2,2-Tetrachloroethane	ND	50
Tetrachloroethene	ND	5.0
Toluene	ND	5.0
Chlorobenzene	ND	5.0
Ethylbenzene	ND	5.0
Styrene	ND	5.0
m,p-Xylenes	ND	5.0
o-Xylene	ND	5.0



Lab #: 128926

BATCH QC REPORT

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EPA 8260 Volatile Organics

Client: Kleinfelder
Project#: 23-900026
Location: TEAD Lust Sites

Analysis Method: EPA 8260
Prep Method: EPA 5030

METHOD BLANK

Matrix: Water
Batch#: 33486
Units: ug/L
Diln Fac: 1

Prep Date: 04/16/97
Analysis Date: 04/16/97

MB Lab ID: QC44225

Analyte	Result	Reporting Limit
1,2,3-Trichloropropane	ND	5.0
1,3-Dichlorobenzene	ND	5.0
1,4-Dichlorobenzene	ND	5.0
1,2-Dichlorobenzene	ND	5.0
Naphthalene	ND	10
Surrogate	%Rec	Recovery Limits
1,2-Dichloroethane-d4	103	76-114
Toluene-d8	101	88-110
Bromofluorobenzene	108	86-115
Dibromofluoromethane	104	76-114



Lab #: 128926

BATCH QC REPORT

EPA 8260 Volatile Organics

Client: Kleinfelder
Project#: 23-900026
Location: TEAD Lust Sites

Analysis Method: EPA 8260
Prep Method: EPA 5030

METHOD BLANK

Matrix: Water
Batch#: 33509
Units: ug/L
Diln Fac: 1

Prep Date: 04/17/97
Analysis Date: 04/17/97

MB Lab ID: QC44283

Analyte	Result	Reporting Limit
Chloromethane	ND	10
Bromomethane	ND	10
Vinyl Chloride	ND	10
Chloroethane	ND	10
Methylene Chloride	ND	10
Acetone	ND	50
Carbon Disulfide	ND	50
Trichlorofluoromethane	ND	5.0
1,1-Dichloroethene	ND	5.0
1,1-Dichloroethane	ND	5.0
trans-1,2-Dichloroethene	ND	5.0
cis-1,2-Dichloroethene	ND	5.0
Chloroform	ND	5.0
1,2-Dichloroethane	ND	5.0
2-Butanone	ND	50
1,1,1-Trichloroethane	ND	5.0
Carbon Tetrachloride	ND	5.0
Vinyl Acetate	ND	50
Bromodichloromethane	ND	5.0
Dibromomethane	ND	5.0
1,2-Dichloropropane	ND	5.0
cis-1,3-Dichloropropene	ND	5.0
Trichloroethene	ND	5.0
Dibromochloromethane	ND	50
1,1,2-Trichloroethane	ND	5.0
Benzene	ND	5.0
trans-1,3-Dichloropropene	ND	5.0
Bromoform	ND	5.0
2-Hexanone	ND	50
4-Methyl-2-Pentanone	ND	50
1,1,2,2-Tetrachloroethane	ND	5.0
Tetrachloroethene	ND	5.0
Toluene	ND	5.0
Chlorobenzene	ND	5.0
Ethylbenzene	ND	5.0
Styrene	ND	5.0
m,p-Xylenes	ND	5.0
o-Xylene	ND	5.0



Lab #: 128926

BATCH QC REPORT

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EPA 8260 Volatile Organics

Client: Kleinfelder
Project#: 23-900026
Location: TEAD Lust Sites

Analysis Method: EPA 8260
Prep Method: EPA 5030

METHOD BLANK

Matrix: Water
Batch#: 33509
Units: ug/L
Diln Fac: 1

Prep Date: 04/17/97
Analysis Date: 04/17/97

MB Lab ID: QC44283

Analyte	Result	Reporting Limit
1,2,3-Trichloropropane	ND	5.0
1,3-Dichlorobenzene	ND	5.0
1,4-Dichlorobenzene	ND	5.0
1,2-Dichlorobenzene	ND	5.0
Naphthalene	ND	10
Surrogate	%Rec	Recovery Limits
1,2-Dichloroethane-d4	100	76-114
Toluene-d8	100	88-110
Bromofluorobenzene	105	86-115
Dibromofluoromethane	102	76-114



Lab #: 128926

BATCH QC REPORT

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EPA 8260 Volatile Organics

Client: Kleinfelder
Project#: 23-900026
Location: TEAD Lust Sites

Analysis Method: EPA 8260
Prep Method: EPA 5030

METHOD BLANK

Matrix: Water
Batch#: 33509
Units: ug/L
Diln Fac: 1

Prep Date: 04/17/97
Analysis Date: 04/17/97

MB Lab ID: QC44308

Analyte	Result	Reporting Limit
Chloromethane	ND	10
Bromomethane	ND	10
Vinyl Chloride	ND	10
Chloroethane	ND	10
Methylene Chloride	ND	10
Acetone	ND	10
Carbon Disulfide	ND	50
Trichlorofluoromethane	ND	50
1,1-Dichloroethene	ND	5.0
1,1-Dichloroethane	ND	5.0
trans-1,2-Dichloroethene	ND	5.0
cis-1,2-Dichloroethene	ND	5.0
Chloroform	ND	5.0
1,2-Dichloroethane	ND	5.0
2-Butanone	ND	5.0
1,1,1-Trichloroethane	ND	50
Carbon Tetrachloride	ND	5.0
Vinyl Acetate	ND	5.0
Bromodichloromethane	ND	50
Dibromomethane	ND	5.0
1,2-Dichloropropane	ND	5.0
cis-1,3-Dichloropropene	ND	5.0
Trichloroethene	ND	5.0
Dibromochloromethane	ND	5.0
1,1,2-Trichloroethane	ND	50
Benzene	ND	5.0
trans-1,3-Dichloropropene	ND	5.0
Bromoform	ND	5.0
2-Hexanone	ND	5.0
4-Methyl-2-Pentanone	ND	50
1,1,2,2-Tetrachloroethane	ND	50
Tetrachloroethene	ND	5.0
Toluene	ND	5.0
Chlorobenzene	ND	5.0
Ethylbenzene	ND	5.0
Styrene	ND	5.0
m,p-Xylenes	ND	5.0
o-Xylene	ND	5.0



Lab #: 128926

BATCH QC REPORT

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EPA 8260 Volatile Organics

Client: Kleinfelder
Project#: 23-900026
Location: TEAD Lust Sites

Analysis Method: EPA 8260
Prep Method: EPA 5030

METHOD BLANK

Matrix: Water
Batch#: 33509
Units: ug/L
Diln Fac: 1

Prep Date: 04/17/97
Analysis Date: 04/17/97

MB Lab ID: QC44308

Analyte	Result	Reporting Limit
1,2,3-Trichloropropane	ND	5.0
1,3-Dichlorobenzene	ND	5.0
1,4-Dichlorobenzene	ND	5.0
1,2-Dichlorobenzene	ND	5.0
Naphthalene	ND	10
Surrogate	%Rec	Recovery Limits
1,2-Dichloroethane-d4	101	76-114
Toluene-d8	101	88-110
Bromofluorobenzene	104	86-115
Dibromofluoromethane	102	76-114

Lab #: 128926

BATCH QC REPORT



Curtis & Tompkins, Ltd.

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EPA 8260 Volatile Organics

Client: Kleinfelder
Project#: 23-900026
Location: TEAD Lust Sites

Analysis Method: EPA 8260
Prep Method: EPA 5030

LABORATORY CONTROL SAMPLE

Matrix: Water
Batch#: 33410
Units: ug/L
Diln Fac: 1

Prep Date: 04/11/97
Analysis Date: 04/11/97

LCS Lab ID: QC43882

Analyte	Result	Spike Added	%Rec #	Limits
1,1-Dichloroethene	57.22	50	114	61-145
Trichloroethene	51.44	50	103	71-120
Benzene	52.71	50	105	76-127
Toluene	50.11	50	100	76-125
Chlorobenzene	55.29	50	111	75-130
Surrogate	%Rec	Limits		
1,2-Dichloroethane-d4	105	76-114		
Toluene-d8	99	88-110		
Bromofluorobenzene	101	86-115		
Dibromofluoromethane	107	76-114		

Column to be used to flag recovery and RPD values with an asterisk.

* Values outside of QC limits

Spike Recovery: 0 out of 5 outside limits



Lab #: 128926

BATCH QC REPORT

EPA 8260 Volatile Organics

Client: Kleinfelder
Project#: 23-900026
Location: TRAD Lust Sites

Analysis Method: EPA 8260
Prep Method: EPA 5030

LABORATORY CONTROL SAMPLE

Matrix: Soil
Batch#: 33413
Units: ug/Kg
Diln Fac: 1

Prep Date: 04/11/97
Analysis Date: 04/11/97

LCS Lab ID: QC43896

Analyte	Result	Spike Added	%Rec #	Limits
1,1-Dichloroethene	59.01	50	118	59-172
Trichloroethene	51.9	50	104	62-137
Benzene	52.45	50	105	66-142
Toluene	53.55	50	107	59-139
Chlorobenzene	55.62	50	111	60-133
Surrogate	%Rec	Limits		
Toluene-d8	100	84-138		
Bromofluorobenzene	100	59-113		
Dibromofluoromethane	106	70-121		
1,2-Dichloroethane-d4	105	70-121		

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

Spike Recovery: 0 out of 5 outside limits



Lab #: 128926

BATCH QC REPORT

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EPA 8260 Volatile Organics

Client: Kleinfelder
Project#: 23-900026
Location: TEAD Lust Sites

Analysis Method: EPA 8260
Prep Method: EPA 5030

LABORATORY CONTROL SAMPLE

Matrix: Water
Batch#: 33486
Units: ug/L
Diln Fac: 1

Prep Date: 04/16/97
Analysis Date: 04/16/97

LCS Lab ID: QC44193

Analyte	Result	Spike Added	%Rec #	Limits
1,1-Dichloroethene	55.81	50	112	61-145
Trichloroethene	52.41	50	105	71-120
Benzene	53.66	50	107	76-127
Toluene	54.58	50	109	76-125
Chlorobenzene	54.3	50	109	75-130
Surrogate	%Rec	Limits		
1,2-Dichloroethane-d4	103	76-114		
Toluene-d8	104	88-110		
Bromofluorobenzene	100	86-115		
Dibromofluoromethane	102	76-114		

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

Spike Recovery: 0 out of 5 outside limits



Lab #: 128926

BATCH QC REPORT

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EPA 8260 Volatile Organics

Client: Kleinfelder
Project#: 23-900026
Location: TEAD Lust Sites

Analysis Method: EPA 8260
Prep Method: EPA 5030

LABORATORY CONTROL SAMPLE

Matrix: Water
Batch#: 33509
Units: ug/L
Diln Fac: 1

Prep Date: 04/17/97
Analysis Date: 04/17/97

LCS Lab ID: QC44282

Analyte	Result	Spike Added	%Rec #	Limits
1,1-Dichloroethene	53.38	50	107	61-145
Trichloroethene	50.39	50	101	71-120
Benzene	52.61	50	105	76-127
Toluene	53.26	50	107	76-125
Chlorobenzene	53.06	50	106	75-130
Surrogate	%Rec	Limits		
1,2-Dichloroethane-d4	99	76-114		
Toluene-d8	104	88-110		
Bromofluorobenzene	102	86-115		
Dibromofluoromethane	99	76-114		

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

Spike Recovery: 0 out of 5 outside limits

Lab #: 128926

BATCH QC REPORT



Curtis & Tompkins, Ltd.

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EPA 8260 Volatile Organics

Client: Kleinfelder
 Project#: 23-900026
 Location: TREAD Lust Sites

Analysis Method: EPA 8260
 Prep Method: EPA 5030

MATRIX SPIKE/MATRIX SPIKE DUPLICATE

Field ID: U3WQ040401
 Lab ID: 128926-006
 Matrix: Water
 Batch#: 33410
 Units: ug/L
 Diln Fac: 1

Sample Date: 04/04/97
 Received Date: 04/10/97
 Prep Date: 04/11/97
 Analysis Date: 04/11/97

MS Lab ID: QC43951

Analyte	Spike Added	Sample	MS	%Rec #	Limits
1,1-Dichloroethene	50	<5	51.31	103	61-145
Trichloroethene	50	<5	47.93	96	71-120
Benzene	50	<5	49.88	100	76-127
Toluene	50	<5	51.15	102	76-125
Chlorobenzene	50	<5	53.91	108	75-130
Surrogate	%Rec	Limits			
1,2-Dichloroethane-d4	109	76-114			
Toluene-d8	100	88-110			
Bromofluorobenzene	99	86-115			
Dibromofluoromethane	109	76-114			

MSD Lab ID: QC43952

Analyte	Spike Added	MSD	%Rec #	Limits	RPD #	Limit
1,1-Dichloroethene	50	50.28	101	61-145	2	20
Trichloroethene	50	48.53	97	71-120	1	20
Benzene	50	50.2	100	76-127	1	20
Toluene	50	50.98	102	76-125	0	20
Chlorobenzene	50	53.87	108	75-130	0	20
Surrogate	%Rec	Limits				
1,2-Dichloroethane-d4	107	76-114				
Toluene-d8	101	88-110				
Bromofluorobenzene	100	86-115				
Dibromofluoromethane	108	76-114				

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

RPD: 0 out of 5 outside limits

Spike Recovery: 0 out of 10 outside limits



Lab #: 128926

BATCH QC REPORT

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EPA 8260 Volatile Organics

Client: Kleinfelder
Project#: 23-900026
Location: TRAD Lust Sites

Analysis Method: EPA 8260
Prep Method: EPA 5030

MATRIX SPIKE/MATRIX SPIKE DUPLICATE

Field ID: ZZZZZZ
Lab ID: 128886-001
Matrix: Soil
Batch#: 33413
Units: ug/Kg dry weight
Diln Fac: 1

Sample Date: 03/28/97
Received Date: 04/07/97
Prep Date: 04/11/97
Analysis Date: 04/11/97
Moisture: 20%

MS Lab ID: QC43905

Analyte	Spike Added	Sample	MS	%Rec #	Limits
1,1-Dichloroethene	62.5	<12.5	76.86	123	59-172
Trichloroethene	62.5	<12.5	65.58	105	62-137
Benzene	62.5	<12.5	66.84	107	66-142
Toluene	62.5	<12.5	65.15	104	59-139
Chlorobenzene	62.5	<12.5	67.32	108	60-133
Surrogate	%Rec	Limits			
Toluene-d8	97	84-138			
Bromofluorobenzene	100	59-113			
Dibromofluoromethane	105	70-121			
1,2-Dichloroethane-d4	94	70-121			

MSD Lab ID: QC43906

Analyte	Spike Added	MSD	%Rec #	Limits	RPD #	Limit
1,1-Dichloroethene	62.5	75.62	121	59-172	2	35
Trichloroethene	62.5	64.8	104	62-137	1	35
Benzene	62.5	65.56	105	66-142	2	35
Toluene	62.5	66.41	106	59-139	2	35
Chlorobenzene	62.5	67.05	107	60-133	0	35
Surrogate	%Rec	Limits				
Toluene-d8	99	84-138				
Bromofluorobenzene	102	59-113				
Dibromofluoromethane	105	70-121				
1,2-Dichloroethane-d4	94	70-121				

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

RPD: 0 out of 5 outside limits

Spike Recovery: 0 out of 10 outside limits



Lab #: 128926

BATCH QC REPORT

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EPA 8260 Volatile Organics

Client: Kleinfelder
Project#: 23-900026
Location: TRAD Lust Sites

Analysis Method: EPA 8260
Prep Method: EPA 5030

MATRIX SPIKE/MATRIX SPIKE DUPLICATE

Field ID: ZZZZZZ
Lab ID: 128940-002
Matrix: Water
Batch#: 33486
Units: ug/L
Diln Fac: 1

Sample Date: 03/25/97
Received Date: 03/26/97
Prep Date: 04/16/97
Analysis Date: 04/16/97

MS Lab ID: QC44222

Analyte	Spike Added	Sample	MS	%Rec #	Limits
1,1-Dichloroethene	50	<5	52.32	105	61-145
Trichloroethene	50	<5	50.5	101	71-120
Benzene	50	5.338	57.46	115	76-127
Toluene	50	<5	52	104	76-125
Chlorobenzene	50	<5	53.62	107	75-130
Surrogate	%Rec	Limits			
1,2-Dichloroethane-d4	109	76-114			
Toluene-d8	101	88-110			
Bromofluorobenzene	98	86-115			
Dibromofluoromethane	105	76-114			

MSD Lab ID: QC44223

Analyte	Spike Added	MSD	%Rec #	Limits	RPD #	Limit
1,1-Dichloroethene	50	50.81	102	61-145	3	20
Trichloroethene	50	48.56	97	71-120	4	20
Benzene	50	56.64	113	76-127	1	20
Toluene	50	50.62	101	76-125	3	20
Chlorobenzene	50	52.82	106	75-130	2	20
Surrogate	%Rec	Limits				
1,2-Dichloroethane-d4	106	76-114				
Toluene-d8	100	88-110				
Bromofluorobenzene	99	86-115				
Dibromofluoromethane	103	76-114				

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

RPD: 0 out of 5 outside limits

Spike Recovery: 0 out of 10 outside limits



Lab #: 128926

BATCH QC REPORT

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EPA 8260 Volatile Organics

Client: Kleinfelder
Project#: 23-900026
Location: TRAD Lust Sites

Analysis Method: EPA 8260
Prep Method: EPA 5030

MATRIX SPIKE/MATRIX SPIKE DUPLICATE

Field ID: ZZZZZZ
Lab ID: 128933-001
Matrix: Water
Batch#: 33509
Units: ug/L
Diln Fac: 2

Sample Date: 04/10/97
Received Date: 04/10/97
Prep Date: 04/17/97
Analysis Date: 04/17/97

MS Lab ID: QC44305

Analyte	Spike Added	Sample	MS	%Rec #	Limits
1,1-Dichloroethene	100	<10	104	103	61-145
Trichloroethene	100	202.2	291.5	89	71-120
Benzene	100	0	103.4	103	76-127
Toluene	100	0	103.4	103	76-125
Chlorobenzene	100	<10	105.3	105	75-130
Surrogate	%Rec	Limits			
1,2-Dichloroethane-d4	97	76-114			
Toluene-d8	100	88-110			
Bromofluorobenzene	100	86-115			
Dibromofluoromethane	101	76-114			

MSD Lab ID: QC44306

Analyte	Spike Added	MSD	%Rec #	Limits	RPD #	Limit
1,1-Dichloroethene	100	104.2	103	61-145	0	20
Trichloroethene	100	287.6	85	71-120	1	20
Benzene	100	103	103	76-127	0	20
Toluene	100	102	102	76-125	1	20
Chlorobenzene	100	106.9	107	75-130	2	20
Surrogate	%Rec	Limits				
1,2-Dichloroethane-d4	96	76-114				
Toluene-d8	99	88-110				
Bromofluorobenzene	100	86-115				
Dibromofluoromethane	101	76-114				

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

RPD: 0 out of 5 outside limits

Spike Recovery: 0 out of 10 outside limits



Semivolatile Organics by GC/MS

Client: Kleinfelder
Project#: 23-900026
Location: TEAD Lust Sites

Analysis Method: EPA 8270
Prep Method: EPA 3550

Field ID: U3SP040402
Lab ID: 128926-001
Matrix: Soil
Batch#: 33452
Units: ug/Kg dry weight
Diln Fac: 10

Sampled: 04/04/97
Received: 04/10/97
Extracted: 04/14/97
Analyzed: 04/25/97
Moisture: 23%

Analyte	Result	Reporting Limit
Phenol	ND	4300
2-Chlorophenol	ND	4300
Benzyl alcohol	ND	4300
2-Methylphenol	ND	4300
4-Methylphenol	ND	4300
2-Nitrophenol	ND	4300
2,4-Dimethylphenol	ND	22000
Benzoic acid	ND	4300
2,4-Dichlorophenol	ND	22000
4-Chloro-3-methylphenol	ND	4300
2,4,6-Trichlorophenol	ND	4300
2,4,5-Trichlorophenol	ND	4300
2,4-Dinitrophenol	ND	22000
4-Nitrophenol	ND	22000
4,6-Dinitro-2-methylphenol	ND	22000
Pentachlorophenol	ND	22000
N-Nitrosodimethylamine	ND	22000
Aniline	ND	4300
bis(2-Chloroethyl) ether	ND	4300
1,3-Dichlorobenzene	ND	4300
1,4-Dichlorobenzene	ND	4300
1,2-Dichlorobenzene	ND	4300
bis(2-Chloroisopropyl) ether	ND	4300
N-Nitroso-di-n-propylamine	ND	4300
Hexachloroethane	ND	4300
Nitrobenzene	ND	4300
Isophorone	ND	4300
bis(2-Chloroethoxy) methane	ND	4300
1,2,4-Trichlorobenzene	ND	4300
Naphthalene	ND	4300
4-Chloroaniline	ND	4300
Hexachlorobutadiene	ND	4300
2-Methylnaphthalene	5500	4300
Hexachlorocyclopentadiene	ND	4300
2-Chloronaphthalene	ND	4300
2-Nitroaniline	ND	4300
Dimethylphthalate	ND	22000
Acenaphthylene	ND	4300

Semivolatile Organics by GC/MS

Field ID: U3SP040402
Lab ID: 128926-001
Matrix: Soil
Batch#: 33452
Units: ug/Kg dry weight
Diln Fac: 10

Sampled: 04/04/97
Received: 04/10/97
Extracted: 04/14/97
Analyzed: 04/25/97
Moisture: 23%

Analyte	Result	Reporting Limit
2,6-Dinitrotoluene	ND	4300
3-Nitroaniline	ND	22000
Acenaphthene	ND	4300
Dibenzofuran	ND	4300
2,4-Dinitrotoluene	ND	4300
Diethylphthalate	ND	4300
4-Chlorophenyl-phenylether	ND	4300
Fluorene	ND	4300
4-Nitroaniline	ND	22000
N-Nitrosodiphenylamine	ND	4300
Azobenzene	ND	4300
4-Bromophenyl-phenylether	ND	4300
Hexachlorobenzene	ND	4300
Phenanthrene	4700	4300
Anthracene	ND	4300
Di-n-butylphthalate	ND	4300
Fluoranthene	ND	4300
Benzidine	ND	4300
Pyrene	ND	4300
Butylbenzylphthalate	ND	4300
3,3'-Dichlorobenzidine	ND	22000
Benzo(a)anthracene	ND	4300
Chrysene	ND	4300
bis(2-Ethylhexyl)phthalate	ND	4300
Di-n-octylphthalate	ND	4300
Benzo(b)fluoranthene	ND	4300
Benzo(k)fluoranthene	ND	4300
Benzo(a)pyrene	ND	4300
Indeno(1,2,3-cd)pyrene	ND	4300
Dibenz(a,h)anthracene	ND	4300
Benzo(g,h,i)perylene	ND	4300

Surrogate	%Recovery	Recovery Limits
2-Fluorophenol	73	25-121
Phenol-d5	75	24-113
2,4,6-Tribromophenol	42	19-122
Nitrobenzene-d5	74	23-120
2-Fluorobiphenyl	65	30-115
Terphenyl-d14	99	18-137



Semivolatile Organics by GC/MS

Client: Kleinfelder
Project#: 23-900026
Location: TEAD Lust Sites

Analysis Method: EPA 8270
Prep Method: EPA 3550

Field ID: U3SP040502
Lab ID: 128926-002
Matrix: Soil
Batch#: 33452
Units: ug/Kg dry weight
Diln Fac: 50

Sampled: 04/05/97
Received: 04/10/97
Extracted: 04/14/97
Analyzed: 04/23/97
Moisture: 18%

Analyte	Result	Reporting Limit
Phenol	ND	21000
2-Chlorophenol	ND	21000
Benzyl alcohol	ND	21000
2-Methylphenol	ND	21000
4-Methylphenol	ND	21000
2-Nitrophenol	ND	100000
2,4-Dimethylphenol	ND	21000
Benzoic acid	ND	100000
2,4-Dichlorophenol	ND	21000
4-Chloro-3-methylphenol	ND	21000
2,4,6-Trichlorophenol	ND	21000
2,4,5-Trichlorophenol	ND	100000
2,4-Dinitrophenol	ND	100000
4-Nitrophenol	ND	100000
4,6-Dinitro-2-methylphenol	ND	100000
Pentachlorophenol	ND	100000
N-Nitrosodimethylamine	ND	21000
Aniline	ND	21000
bis(2-Chloroethyl) ether	ND	21000
1,3-Dichlorobenzene	ND	21000
1,4-Dichlorobenzene	ND	21000
1,2-Dichlorobenzene	ND	21000
bis(2-Chloroisopropyl) ether	ND	21000
N-Nitroso-di-n-propylamine	ND	21000
Hexachloroethane	ND	21000
Nitrobenzene	ND	21000
Isophorone	ND	21000
bis(2-Chloroethoxy) methane	ND	21000
1,2,4-Trichlorobenzene	ND	21000
Naphthalene	ND	21000
4-Chloroaniline	ND	21000
Hexachlorobutadiene	ND	21000
2-Methylnaphthalene	18000 J	21000
Hexachlorocyclopentadiene	ND	21000
2-Chloronaphthalene	ND	21000
2-Nitroaniline	ND	100000
Dimethylphthalate	ND	21000
Acenaphthylene	ND	21000



Semivolatile Organics by GC/MS

Field ID: U3SP040502
Lab ID: 128926-002
Matrix: Soil
Batch#: 33452
Units: ug/Kg dry weight
Diln Fac: 50

Sampled: 04/05/97
Received: 04/10/97
Extracted: 04/14/97
Analyzed: 04/23/97
Moisture: 18%

Analyte	Result	Reporting Limit
2,6-Dinitrotoluene	ND	21000
3-Nitroaniline	ND	100000
Acenaphthene	ND	21000
Dibenzofuran	ND	21000
2,4-Dinitrotoluene	ND	21000
Diethylphthalate	ND	21000
4-Chlorophenyl-phenylether	ND	21000
Fluorene	ND	21000
4-Nitroaniline	ND	100000
N-Nitrosodiphenylamine	ND	21000
Azobenzene	ND	21000
4-Bromophenyl-phenylether	ND	21000
Hexachlorobenzene	ND	21000
Phenanthrene	ND	21000
Anthracene	ND	21000
Di-n-butylphthalate	ND	21000
Fluoranthene	ND	21000
Benzidine	ND	21000
Pyrene	ND	21000
Butylbenzylphthalate	ND	21000
3,3'-Dichlorobenzidine	ND	100000
Benzo(a)anthracene	ND	21000
Chrysene	ND	21000
bis(2-Ethylhexyl)phthalate	ND	21000
Di-n-octylphthalate	ND	21000
Benzo(b)fluoranthene	ND	21000
Benzo(k)fluoranthene	ND	21000
Benzo(a)pyrene	ND	21000
Indeno(1,2,3-cd)pyrene	ND	21000
Dibenz(a,h)anthracene	ND	21000
Benzo(g,h,i)perylene	ND	21000
Surrogate	%Recovery	Recovery Limits
2-Fluorophenol	DO*	25-121
Phenol-d5	DO*	24-113
2,4,6-Tribromophenol	DO*	19-122
Nitrobenzene-d5	DO*	23-120
2-Fluorobiphenyl	DO*	30-115
Terphenyl-d14	DO*	18-137

J: Estimated Value

* Values outside of QC limits

Semivolatile Organics by GC/MS

Client: Kleinfelder
Project#: 23-900026
Location: TEAD Lust Sites

Analysis Method: EPA 8270
Prep Method: EPA 3550

Field ID: U3SP040702
Lab ID: 128926-003
Matrix: Soil
Batch#: 33452
Units: ug/Kg dry weight
Diln Fac: 1

Sampled: 04/07/97
Received: 04/10/97
Extracted: 04/14/97
Analyzed: 04/17/97
Moisture: 4%

Analyte	Result	Reporting Limit
Phenol	ND	340
2-Chlorophenol	ND	340
Benzyl alcohol	ND	340
2-Methylphenol	ND	340
4-Methylphenol	ND	340
2-Nitrophenol	ND	340
2,4-Dimethylphenol	ND	1800
Benzoic acid	ND	340
2,4-Dichlorophenol	ND	1800
4-Chloro-3-methylphenol	ND	340
2,4,6-Trichlorophenol	ND	340
2,4,5-Trichlorophenol	ND	340
2,4-Dinitrophenol	ND	1800
4-Nitrophenol	ND	1800
4,6-Dinitro-2-methylphenol	ND	1800
Pentachlorophenol	ND	1800
N-Nitrosodimethylamine	ND	1800
Aniline	ND	340
bis(2-Chloroethyl)ether	ND	340
1,3-Dichlorobenzene	ND	340
1,4-Dichlorobenzene	ND	340
1,2-Dichlorobenzene	ND	340
bis(2-Chloroisopropyl) ether	ND	340
N-Nitroso-di-n-propylamine	ND	340
Hexachloroethane	ND	340
Nitrobenzene	ND	340
Isophorone	ND	340
bis(2-Chloroethoxy)methane	ND	340
1,2,4-Trichlorobenzene	ND	340
Naphthalene	ND	340
4-Chloroaniline	ND	340
Hexachlorobutadiene	ND	340
2-Methylnaphthalene	ND	340
Hexachlorocyclopentadiene	ND	340
2-Chloronaphthalene	ND	340
2-Nitroaniline	ND	340
Dimethylphthalate	ND	1800
Acenaphthylene	ND	340

Semivolatile Organics by GC/MS

Field ID: U3SP040702	Sampled: 04/07/97
Lab ID: 128926-003	Received: 04/10/97
Matrix: Soil	Extracted: 04/14/97
Batch#: 33452	Analyzed: 04/17/97
Units: ug/Kg dry weight	Moisture: 4%
Diln Fac: 1	

Analyte	Result	Reporting Limit
2,6-Dinitrotoluene	ND	340
3-Nitroaniline	ND	1800
Acenaphthene	ND	340
Dibenzofuran	ND	340
2,4-Dinitrotoluene	ND	340
Diethylphthalate	ND	340
4-Chlorophenyl-phenylether	ND	340
Fluorene	ND	340
4-Nitroaniline	ND	1800
N-Nitrosodiphenylamine	ND	340
Azobenzene	ND	340
4-Bromophenyl-phenylether	ND	340
Hexachlorobenzene	ND	340
Phenanthrene	ND	340
Anthracene	ND	340
Di-n-butylphthalate	ND	340
Fluoranthene	ND	340
Benzidine	ND	340
Pyrene	ND	340
Butylbenzylphthalate	ND	340
3,3'-Dichlorobenzidine	ND	1800
Benzo(a)anthracene	ND	340
Chrysene	ND	340
bis(2-Ethylhexyl)phthalate	3000	340
Di-n-octylphthalate	ND	340
Benzo(b)fluoranthene	ND	340
Benzo(k)fluoranthene	ND	340
Benzo(a)pyrene	ND	340
Indeno(1,2,3-cd)pyrene	ND	340
Dibenz(a,h)anthracene	ND	340
Benzo(g,h,i)perylene	ND	340

Surrogate	%Recovery	Recovery Limits
2-Fluorophenol	77	25-121
Phenol-d5	81	24-113
2,4,6-Tribromophenol	73	19-122
Nitrobenzene-d5	89	23-120
2-Fluorobiphenyl	94	30-115
Terphenyl-d14	97	18-137



Semivolatile Organics by GC/MS

Client: Kleinfelder
Project#: 23-900026
Location: TEAD Lust Sites

Analysis Method: EPA 8270
Prep Method: EPA 3550

Field ID: U3SP040803
Lab ID: 128926-004
Matrix: Soil
Batch#: 33452
Units: ug/Kg dry weight
Diln Fac: 1

Sampled: 04/08/97
Received: 04/10/97
Extracted: 04/14/97
Analyzed: 04/17/97
Moisture: 5%

Analyte	Result	Reporting Limit
Phenol	ND	350
2-Chlorophenol	ND	350
Benzyl alcohol	ND	350
2-Methylphenol	ND	350
4-Methylphenol	ND	350
2-Nitrophenol	ND	1800
2,4-Dimethylphenol	ND	350
Benzoic acid	ND	1800
2,4-Dichlorophenol	ND	350
4-Chloro-3-methylphenol	ND	350
2,4,6-Trichlorophenol	ND	350
2,4,5-Trichlorophenol	ND	1800
2,4-Dinitrophenol	ND	1800
4-Nitrophenol	ND	1800
4,6-Dinitro-2-methylphenol	ND	1800
Pentachlorophenol	ND	1800
N-Nitrosodimethylamine	ND	350
Aniline	ND	350
bis(2-Chloroethyl) ether	ND	350
1,3-Dichlorobenzene	ND	350
1,4-Dichlorobenzene	ND	350
1,2-Dichlorobenzene	ND	350
bis(2-Chloroisopropyl) ether	ND	350
N-Nitroso-di-n-propylamine	ND	350
Hexachloroethane	ND	350
Nitrobenzene	ND	350
Isophorone	ND	350
bis(2-Chloroethoxy) methane	ND	350
1,2,4-Trichlorobenzene	ND	350
Naphthalene	ND	350
4-Chloroaniline	ND	350
Hexachlorobutadiene	ND	350
2-Methylnaphthalene	ND	350
Hexachlorocyclopentadiene	ND	350
2-Chloronaphthalene	ND	350
2-Nitroaniline	ND	1800
Dimethylphthalate	ND	350
Acenaphthylene	ND	350

Semivolatile Organics by GC/MS

Field ID: U3SP040803	Sampled: 04/08/97
Lab ID: 128926-004	Received: 04/10/97
Matrix: Soil	Extracted: 04/14/97
Batch#: 33452	Analyzed: 04/17/97
Units: ug/Kg dry weight	Moisture: 5%
Diln Fac: 1	

Analyte	Result	Reporting Limit
2,6-Dinitrotoluene	ND	350
3-Nitroaniline	ND	1800
Acenaphthene	ND	350
Dibenzofuran	ND	350
2,4-Dinitrotoluene	ND	350
Diethylphthalate	ND	350
4-Chlorophenyl-phenylether	ND	350
Fluorene	ND	350
4-Nitroaniline	ND	1800
N-Nitrosodiphenylamine	ND	350
Azobenzene	ND	350
4-Bromophenyl-phenylether	ND	350
Hexachlorobenzene	ND	350
Phenanthrene	ND	350
Anthracene	ND	350
Di-n-butylphthalate	ND	350
Fluoranthene	ND	350
Benzidine	ND	350
Pyrene	ND	350
Butylbenzylphthalate	ND	350
3,3'-Dichlorobenzidine	ND	1800
Benzo(a)anthracene	ND	350
Chrysene	ND	350
bis(2-Ethylhexyl)phthalate	ND	350
Di-n-octylphthalate	ND	350
Benzo(b)fluoranthene	ND	350
Benzo(k)fluoranthene	ND	350
Benzo(a)pyrene	ND	350
Indeno(1,2,3-cd)pyrene	ND	350
Dibenz(a,h)anthracene	ND	350
Benzo(g,h,i)perylene	ND	350

Surrogate	%Recovery	Recovery Limits
2-Fluorophenol	68	25-121
Phenol-d5	77	24-113
2,4,6-Tribromophenol	61	19-122
Nitrobenzene-d5	85	23-120
2-Fluorobiphenyl	90	30-115
Terphenyl-d14	86	18-137



Semivolatile Organics by GC/MS

Client: Kleinfelder
Project#: 23-900026
Location: TEAD Lust Sites

Analysis Method: EPA 8270
Prep Method: EPA 3550

Field ID: U3SP040401
Lab ID: 128926-007
Matrix: Soil
Batch#: 33452
Units: ug/Kg dry weight
Diln Fac: 10

Sampled: 04/04/97
Received: 04/10/97
Extracted: 04/14/97
Analyzed: 04/25/97
Moisture: 17%

Analyte	Result	Reporting Limit
Phenol	ND	4000
2-Chlorophenol	ND	4000
Benzyl alcohol	ND	4000
2-Methylphenol	ND	4000
4-Methylphenol	ND	4000
2-Nitrophenol	ND	4000
2,4-Dimethylphenol	ND	20000
Benzoic acid	ND	4000
2,4-Dichlorophenol	ND	20000
4-Chloro-3-methylphenol	ND	4000
2,4,6-Trichlorophenol	ND	4000
2,4,5-Trichlorophenol	ND	4000
2,4-Dinitrophenol	ND	20000
4-Nitrophenol	ND	20000
4,6-Dinitro-2-methylphenol	ND	20000
Pentachlorophenol	ND	20000
N-Nitrosodimethylamine	ND	4000
Aniline	ND	4000
bis(2-Chloroethyl) ether	ND	4000
1,3-Dichlorobenzene	ND	4000
1,4-Dichlorobenzene	ND	4000
1,2-Dichlorobenzene	ND	4000
bis(2-Chloroisopropyl) ether	ND	4000
N-Nitroso-di-n-propylamine	ND	4000
Hexachloroethane	ND	4000
Nitrobenzene	ND	4000
Isophorone	ND	4000
bis(2-Chloroethoxy) methane	ND	4000
1,2,4-Trichlorobenzene	ND	4000
Naphthalene	ND	4000
4-Chloroaniline	ND	4000
Hexachlorobutadiene	ND	4000
2-Methylnaphthalene	7400	4000
Hexachlorocyclopentadiene	ND	4000
2-Chloronaphthalene	ND	4000
2-Nitroaniline	ND	20000
Dimethylphthalate	ND	4000
Acenaphthylene	ND	4000



Semivolatile Organics by GC/MS

Field ID: U3SP040401	Sampled: 04/04/97
Lab ID: 128926-007	Received: 04/10/97
Matrix: Soil	Extracted: 04/14/97
Batch#: 33452	Analyzed: 04/25/97
Units: ug/Kg dry weight	Moisture: 17%
Diln Fac: 10	

Analyte	Result	Reporting Limit
2,6-Dinitrotoluene	ND	4000
3-Nitroaniline	ND	20000
Acenaphthene	ND	4000
Dibenzofuran	ND	4000
2,4-Dinitrotoluene	ND	4000
Diethylphthalate	ND	4000
4-Chlorophenyl-phenylether	ND	4000
Fluorene	ND	4000
4-Nitroaniline	ND	20000
N-Nitrosodiphenylamine	ND	4000
Azobenzene	ND	4000
4-Bromophenyl-phenylether	ND	4000
Hexachlorobenzene	ND	4000
Phenanthrene	10000	4000
Anthracene	ND	4000
Di-n-butylphthalate	ND	4000
Fluoranthene	ND	4000
Benzidine	ND	4000
Pyrene	6800	4000
Butylbenzylphthalate	ND	4000
3,3'-Dichlorobenzidine	ND	20000
Benzo(a)anthracene	3200 J	4000
Chrysene	8100	4000
bis(2-Ethylhexyl)phthalate	ND	4000
Di-n-octylphthalate	ND	4000
Benzo(b)fluoranthene	ND	4000
Benzo(k)fluoranthene	ND	4000
Benzo(a)pyrene	4600	4000
Indeno(1,2,3-cd)pyrene	ND	4000
Dibenz(a,h)anthracene	ND	4000
Benzo(g,h,i)perylene	ND	4000

Surrogate	%Recovery	Recovery Limits
2-Fluorophenol	82	25-121
Phenol-d5	79	24-113
2,4,6-Tribromophenol	49	19-122
Nitrobenzene-d5	84	23-120
2-Fluorobiphenyl	73	30-115
Terphenyl-d14	100	18-137

J: Estimated Value



Semivolatile Organics by GC/MS

Client: Kleinfelder
Project#: 23-900026
Location: TEAD Lust Sites

Analysis Method: EPA 8270
Prep Method: EPA 3550

Field ID: U3SQ040401
Lab ID: 128926-008
Matrix: Soil
Batch#: 33452
Units: ug/Kg dry weight
Diln Fac: 10

Sampled: 04/04/97
Received: 04/10/97
Extracted: 04/14/97
Analyzed: 04/25/97
Moisture: 17%

Analyte	Result	Reporting Limit
Phenol	ND	4000
2-Chlorophenol	ND	4000
Benzyl alcohol	ND	4000
2-Methylphenol	ND	4000
4-Methylphenol	ND	4000
2-Nitrophenol	ND	4000
2,4-Dimethylphenol	ND	20000
Benzoic acid	ND	4000
2,4-Dichlorophenol	ND	20000
4-Chloro-3-methylphenol	ND	4000
2,4,6-Trichlorophenol	ND	4000
2,4,5-Trichlorophenol	ND	4000
2,4-Dinitrophenol	ND	20000
4-Nitrophenol	ND	20000
4,6-Dinitro-2-methylphenol	ND	20000
Pentachlorophenol	ND	20000
N-Nitrosodimethylamine	ND	4000
Aniline	ND	4000
bis(2-Chloroethyl)ether	ND	4000
1,3-Dichlorobenzene	ND	4000
1,4-Dichlorobenzene	ND	4000
1,2-Dichlorobenzene	ND	4000
bis(2-Chloroisopropyl) ether	ND	4000
N-Nitroso-di-n-propylamine	ND	4000
Hexachloroethane	ND	4000
Nitrobenzene	ND	4000
Isophorone	ND	4000
bis(2-Chloroethoxy)methane	ND	4000
1,2,4-Trichlorobenzene	ND	4000
Naphthalene	ND	4000
4-Chloroaniline	ND	4000
Hexachlorobutadiene	ND	4000
2-Methylnaphthalene	5200	4000
Hexachlorocyclopentadiene	ND	4000
2-Chloronaphthalene	ND	4000
2-Nitroaniline	ND	4000
Dimethylphthalate	ND	20000
Acenaphthylene	ND	4000



Semivolatile Organics by GC/MS

Field ID: U3SQ040401
Lab ID: 128926-008
Matrix: Soil
Batch#: 33452
Units: ug/Kg dry weight
Diln Fac: 10

Sampled: 04/04/97
Received: 04/10/97
Extracted: 04/14/97
Analyzed: 04/25/97
Moisture: 17%

Analyte	Result	Reporting Limit
2,6-Dinitrotoluene	ND	4000
3-Nitroaniline	ND	20000
Acenaphthene	ND	4000
Dibenzofuran	ND	4000
2,4-Dinitrotoluene	ND	4000
Diethylphthalate	ND	4000
4-Chlorophenyl-phenylether	ND	4000
Fluorene	ND	4000
4-Nitroaniline	ND	20000
N-Nitrosodiphenylamine	ND	4000
Azobenzene	ND	4000
4-Bromophenyl-phenylether	ND	4000
Hexachlorobenzene	ND	4000
Phenanthrene	7200	4000
Anthracene	ND	4000
Di-n-butylphthalate	ND	4000
Fluoranthene	ND	4000
Benzidine	ND	4000
Pyrene	4900	4000
Butylbenzylphthalate	ND	4000
3,3'-Dichlorobenzidine	ND	20000
Benzo(a)anthracene	2300 J	4000
Chrysene	5800	4000
bis(2-Ethylhexyl)phthalate	ND	4000
Di-n-octylphthalate	ND	4000
Benzo(b)fluoranthene	ND	4000
Benzo(k)fluoranthene	ND	4000
Benzo(a)pyrene	3300 J	4000
Indeno(1,2,3-cd)pyrene	ND	4000
Dibenz(a,h)anthracene	ND	4000
Benzo(g,h,i)perylene	ND	4000
Surrogate	%Recovery	Recovery Limits
2-Fluorophenol	77	25-121
Phenol-d5	74	24-113
2,4,6-Tribromophenol	39	19-122
Nitrobenzene-d5	71	23-120
2-Fluorobiphenyl	66	30-115
Terphenyl-d14	85	18-137

J: Estimated Value

Lab #: 128926

BATCH QC REPORT



Curtis & Tompkins, Ltd.

Page 1 of 2

Client: Kleinfelder		Analysis Method: EPA 8270	
Project#: 23-900026		Prep Method: EPA 3550	
Location: TEAD Lust Sites			
METHOD BLANK			
Matrix: Soil		Prep Date: 04/14/97	
Batch#: 33452		Analysis Date: 04/16/97	
Units: ug/Kg			
Diln Fac: 1			

MB Lab ID: QC44064

Analyte	Result	Reporting Limit
Phenol	ND	330
2-Chlorophenol	ND	330
Benzyl alcohol	ND	330
2-Methylphenol	ND	330
4-Methylphenol	ND	330
2-Nitrophenol	ND	330
2,4-Dimethylphenol	ND	1700
Benzoic acid	ND	330
2,4-Dichlorophenol	ND	1700
4-Chloro-3-methylphenol	ND	330
2,4,6-Trichlorophenol	ND	330
2,4,5-Trichlorophenol	ND	330
2,4-Dinitrophenol	ND	1700
4-Nitrophenol	ND	1700
4,6-Dinitro-2-methylphenol	ND	1700
Pentachlorophenol	ND	1700
N-Nitrosodimethylamine	ND	1700
Aniline	ND	330
bis(2-Chloroethyl) ether	ND	330
1,3-Dichlorobenzene	ND	330
1,4-Dichlorobenzene	ND	330
1,2-Dichlorobenzene	ND	330
bis(2-Chloroisopropyl) ether	ND	330
N-Nitroso-di-n-propylamine	ND	330
Hexachloroethane	ND	330
Nitrobenzene	ND	330
Isophorone	ND	330
bis(2-Chloroethoxy) methane	ND	330
1,2,4-Trichlorobenzene	ND	330
Naphthalene	ND	330
4-Chloroaniline	ND	330
Hexachlorobutadiene	ND	330
2-Methylnaphthalene	ND	330
Hexachlorocyclopentadiene	ND	330
2-Chloronaphthalene	ND	330
2-Nitroaniline	ND	330
Dimethylphthalate	ND	1700
Acenaphthylene	ND	330
2,6-Dinitrotoluene	ND	330
3-Nitroaniline	ND	330
		1700



Lab #: 128926

BATCH QC REPORT

Page 2 of 2

Client: Kleinfelder		Analysis Method: EPA 8270	
Project#: 23-900026		Prep Method: EPA 3550	
Location: TEAD Lust Sites			
METHOD BLANK			
Matrix: Soil		Prép Date: 04/14/97	
Batch#: 33452		Analysis Date: 04/16/97	
Units: ug/Kg			
Diln Fac: 1			

MB Lab ID: QC44064

Analyte	Result	Reporting Limit
Acenaphthene	ND	330
Dibenzofuran	ND	330
2,4-Dinitrotoluene	ND	330
Diethylphthalate	ND	330
4-Chlorophenyl-phenylether	ND	330
Fluorene	ND	330
4-Nitroaniline	ND	1700
N-Nitrosodiphenylamine	ND	330
Azobenzene	ND	330
4-Bromophenyl-phenylether	ND	330
Hexachlorobenzene	ND	330
Phenanthrene	ND	330
Anthracene	ND	330
Di-n-butylphthalate	ND	330
Fluoranthene	ND	330
Benzidine	ND	330
Pyrene	ND	330
Butylbenzylphthalate	ND	330
3,3'-Dichlorobenzidine	ND	1700
Benzo(a)anthracene	ND	330
Chrysene	ND	330
bis(2-Ethylhexyl)phthalate	ND	330
Di-n-octylphthalate	ND	330
Benzo(b)fluoranthene	ND	330
Benzo(k)fluoranthene	ND	330
Benzo(a)pyrene	ND	330
Indeno(1,2,3-cd)pyrene	ND	330
Dibenz(a,h)anthracene	ND	330
Benzo(g,h,i)perylene	ND	330
Surrogate	%Rec	Recovery Limits
2-Fluorophenol	88	25-121
Phenol-d5	83	24-113
2,4,6-Tribromophenol	75	19-122
Nitrobenzene-d5	80	23-120
2-Fluorobiphenyl	75	30-115
Terphenyl-d14	84	18-137



Lab #: 128926

BATCH QC REPORT

Page 1 of 1

EPA 8270 Semi-Volatile Organics

Client: Kleinfelder
Project#: 23-900026
Location: TEAD Lust Sites

Analysis Method: EPA 8270
Prep Method: EPA 3550

LABORATORY CONTROL SAMPLE

Matrix: Soil
Batch#: 33452
Units: ug/Kg
Diln Fac: 1

Prep Date: 04/14/97
Analysis Date: 04/16/97

LCS Lab ID: QC44065

Analyte	Result	Spike Added	%Rec #	Limits
Phenol	2874	3333	86	26-90
2-Chlorophenol	2693	3333	81	25-102
4-Chloro-3-methylphenol	2787	3333	84	26-103
4-Nitrophenol	2780	3333	83	11-114
Pentachlorophenol	2121	3333	64	17-109
1,4-Dichlorobenzene	1045	1667	63	28-104
N-Nitroso-di-n-propylamine	1140	1667	68	41-126
1,2,4-Trichlorobenzene	976.4	1667	59	38-107
Acenaphthene	1074	1667	64	31-137
2,4-Dinitrotoluene	1141	1667	68	28-89
Pyrene	1167	1667	70	35-142
Surrogate	%Rec	Limits		
2-Fluorophenol	84	25-121		
Phenol-d5	83	24-113		
2,4,6-Tribromophenol	79	19-122		
Nitrobenzene-d5	81	23-120		
2-Fluorobiphenyl	72	30-115		
Terphenyl-d14	79	18-137		

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

Spike Recovery: 0 out of 11 outside limits

DO: Surrogate diluted out



Lab #: 128926

BATCH QC REPORT

Page 1 of 1

EPA 8270 Semi-Volatile Organics

Client: Kleinfelder
 Project#: 23-900026
 Location: TEAD Lust Sites

Analysis Method: EPA 8270
 Prep Method: EPA 3550

MATRIX SPIKE/MATRIX SPIKE DUPLICATE

Field ID: U3SP040402
 Lab ID: 128926-001
 Matrix: Soil
 Batch#: 33452
 Units: ug/Kg dry weight
 Diln Fac: 1

Sample Date: 04/04/97
 Received Date: 04/10/97
 Prep Date: 04/14/97
 Analysis Date: 04/17/97
 Moisture: 23%

MS Lab ID: QC44066

Analyte	Spike Added	Sample	MS	%Rec #	Limits
Phenol	4329	<432.9	3508	81	26-90
2-Chlorophenol	4329	<432.9	3511	81	25-102
4-Chloro-3-methylphenol	4329	<432.9	3343	77	26-103
4-Nitrophenol	4329	<2164	2836	66	11-114
Pentachlorophenol	4329	<2164	2489	57	17-109
1,4-Dichlorobenzene	2165	<432.9	1539	71	28-104
N-Nitroso-di-n-propylamine	2165	<432.9	1489	69	41-126
1,2,4-Trichlorobenzene	2165	<432.9	1608	74	38-107
Acenaphthene	2165	<432.9	1737	80	31-137
2,4-Dinitrotoluene	2165	<432.9	1333	62	28-89
Pyrene	2165	<432.9	1625	75	35-142
Surrogate	%Rec	Limits			
2-Fluorophenol	72	25-121			
Phenol-d5	77	24-113			
2,4,6-Tribromophenol	67	19-122			
Nitrobenzene-d5	85	23-120			
2-Fluorobiphenyl	89	30-115			
Terphenyl-d14	84	18-137			

MSD Lab ID: QC44067

Analyte	Spike Added	MSD	%Rec #	Limits	RPD #	Limit
Phenol	4329	3469	80	26-90	1	35
2-Chlorophenol	4329	3467	80	25-102	1	50
4-Chloro-3-methylphenol	4329	3380	78	26-103	1	33
4-Nitrophenol	4329	2883	67	11-114	2	50
Pentachlorophenol	4329	2327	54	17-109	5	47
1,4-Dichlorobenzene	2165	1493	69	28-104	3	27
N-Nitroso-di-n-propylamine	2165	1456	67	41-126	3	38
1,2,4-Trichlorobenzene	2165	1548	72	38-107	3	23
Acenaphthene	2165	1751	81	31-137	1	19
2,4-Dinitrotoluene	2165	1419	66	28-89	6	47
Pyrene	2165	1625	75	35-142	0	36
Surrogate	%Rec	Limits				
2-Fluorophenol	70	25-121				
Phenol-d5	74	24-113				
2,4,6-Tribromophenol	69	19-122				
Nitrobenzene-d5	84	23-120				
2-Fluorobiphenyl	90	30-115				
Terphenyl-d14	84	18-137				

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

RPD: 0 out of 11 outside limits

Spike Recovery: 0 out of 22 outside limits

DO: Surrogate diluted out



TVH-Total Volatile Hydrocarbons

Client: Kleinfelder
Project#: 23-900026
Location: TRAD Lust Sites

Analysis Method: CA LUFT (EPA 8015M)
Prep Method: EPA 5030

Sample #	Client ID	Batch #	Sampled	Extracted	Analyzed	Moisture
128926-001	U3SP040402	33434	04/04/97	04/15/97	04/15/97	23%
128926-002	U3SP040502	33487	04/05/97	04/16/97	04/16/97	18%
128926-003	U3SP040702	33434	04/07/97	04/15/97	04/15/97	4%
128926-004	U3SP040803	33434	04/08/97	04/15/97	04/15/97	5%

Matrix: Soil

Analyte	Units	128926-001	128926-002	128926-003	128926-004
Diln Fac:		100	50	1	1
Gasoline	mg/Kg	520 H	210 H	<1	<1.1
Surrogate					
Trifluorotoluene	%REC	70	60	55	55
Bromobenzene	%REC	132	116	89	90

H: Heavier hydrocarbons than indicated standard



TVH-Total Volatile Hydrocarbons

Client: Kleinfelder
Project#: 23-900026
Location: TRAD Lust Sites

Analysis Method: CA LUFT (EPA 8015M)
Prep Method: EPA 5030

Sample #	Client ID	Batch #	Sampled	Extracted	Analyzed	Moisture
128926-007	U3SP040401	33487	04/04/97	04/16/97	04/16/97	17%
128926-008	U3SQ040401	33487	04/04/97	04/16/97	04/16/97	17%

Matrix: Soil

Analyte	Units	128926-007	128926-008
Diln Fac:		50	25
Gasoline	mg/Kg	180 H	32 H
Surrogate			
Trifluorotoluene	%REC	68	63
Bromobenzene	%REC	116	102

H: Heavier hydrocarbons than indicated standard



Lab #: 128926

BATCH QC REPORT

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TVH-Total Volatile Hydrocarbons

Client: Kleinfelder
Project#: 23-900026
Location: TEAD Lust Sites

Analysis Method: CA LUFT (EPA 8015M)
Prep Method: EPA 5030

METHOD BLANK

Matrix: Soil
Batch#: 33434
Units: mg/Kg
Diln Fac: 1

Prep Date: 04/15/97
Analysis Date: 04/15/97

MB Lab ID: QC43986

Analyte	Result	
Gasoline	<1.0	
Surrogate	%Rec	Recovery Limits
Trifluorotoluene	56	52-127
Bromobenzene	89	65-135



Lab #: 128926

BATCH QC REPORT

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TVH-Total Volatile Hydrocarbons

Client: Kleinfelder
Project#: 23-900026
Location: TEAD Lust Sites

Analysis Method: CA LUFT (EPA 8015M)
Prep Method: EPA 5030

METHOD BLANK

Matrix: Soil
Batch#: 33487
Units: mg/Kg
Diln Fac: 1

Prep Date: 04/16/97
Analysis Date: 04/16/97

MB Lab ID: QC44197

Analyte	Result	
Gasoline	<1.0	
Surrogate	%Rec	Recovery Limits
Trifluorotoluene	54	52-127
Bromobenzene	89	65-135



Lab #: 128926

BATCH QC REPORT

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TVH-Total Volatile Hydrocarbons

Client: Kleinfelder
Project#: 23-900026
Location: TEAD Lust Sites

Analysis Method: CA LUFT (EPA 8015M)
Prep Method: EPA 5030

LABORATORY CONTROL SAMPLE

Matrix: Soil
Batch#: 33434
Units: mg/Kg
Diln Fac: 1

Prep Date: 04/15/97
Analysis Date: 04/15/97

LCS Lab ID: QC43984

Analyte	Result	Spike Added	%Rec #	Limits
Gasoline	10.13	10	101	65-135
Surrogate	%Rec	Limits		
Trifluorotoluene	89	52-127		
Bromobenzene	124	65-135		

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

Spike Recovery: 0 out of 1 outside limits



Lab #: 128926

BATCH QC REPORT

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TVH-Total Volatile Hydrocarbons

Client: Kleinfelder
Project#: 23-900026
Location: TRAD Lust Sites

Analysis Method: CA LUFT (EPA 8015M)
Prep Method: EPA 5030

LABORATORY CONTROL SAMPLE

Matrix: Soil
Batch#: 33487
Units: mg/Kg
Diln Fac: 1

Prep Date: 04/16/97
Analysis Date: 04/16/97

LCS Lab ID: QC44195

Analyte	Result	Spike Added	%Rec #	Limits
Gasoline	10.29	10	103	65-135
Surrogate	%Rec	Limits		
Trifluorotoluene	88	52-127		
Bromobenzene	125	65-135		

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

Spike Recovery: 0 out of 1 outside limits



Lab #: 128926

BATCH QC REPORT

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TVH-Total Volatile Hydrocarbons

Client: Kleinfelder
Project#: 23-900026
Location: TEAD Lust Sites

Analysis Method: CA LUFT (EPA 8015M)
Prep Method: EPA 5030

MATRIX SPIKE/MATRIX SPIKE DUPLICATE

Field ID: U3SP040702
Lab ID: 128926-003
Matrix: Soil
Batch#: 33434
Units: mg/Kg dry weight
Diln Fac: 1

Sample Date: 04/07/97
Received Date: 04/10/97
Prep Date: 04/15/97
Analysis Date: 04/15/97
Moisture: 4%

MS Lab ID: QC43987

Analyte	Spike Added	Sample	MS	%Rec #	Limits
Gasoline	10.42	<1.042	9.125	88	65-135
Surrogate	%Rec	Limits			
Trifluorotoluene	126	52-127			
Bromobenzene	119	65-135			

MSD Lab ID: QC43988

Analyte	Spike Added	MSD	%Rec #	Limits	RPD #	Limit
Gasoline	10.42	9.51	91	65-135	4	35
Surrogate	%Rec	Limits				
Trifluorotoluene	127	52-127				
Bromobenzene	119	65-135				

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

RPD: 0 out of 1 outside limits

Spike Recovery: 0 out of 2 outside limits



Lab #: 128926

BATCH QC REPORT

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TVH-Total Volatile Hydrocarbons

Client: Kleinfelder
Project#: 23-900026
Location: TRAD Lust Sites

Analysis Method: CA LUFT (EPA 8015M)
Prep Method: EPA 5030

MATRIX SPIKE/MATRIX SPIKE DUPLICATE

Field ID: U3SQ040401
Lab ID: 128926-008
Matrix: Soil
Batch#: 33487
Units: mg/Kg dry weight
Diln Fac: 25

Sample Date: 04/04/97
Received Date: 04/10/97
Prep Date: 04/16/97
Analysis Date: 04/16/97
Moisture: 17%

MS Lab ID: QC44198

Analyte	Spike Added	Sample	MS	%Rec #	Limits
Gasoline	12.05	32.37	89.64	19 *	65-135
Surrogate	%Rec	Limits			
Trifluorotoluene	92	52-127			
Bromobenzene	117	65-135			

MSD Lab ID: QC44199

Analyte	Spike Added	MSD	%Rec #	Limits	RPD #	Limit
Gasoline	12.05	92.76	20 *	65-135	5	35
Surrogate	%Rec	Limits				
Trifluorotoluene	93	52-127				
Bromobenzene	117	65-135				

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

RPD: 0 out of 1 outside limits

Spike Recovery: 2 out of 2 outside limits



TVH-Total Volatile Hydrocarbons

Client: Kleinfelder
Project#: 23-900026
Location: TEAD Lust Sites

Analysis Method: CA LUFT (EPA 8015M)
Prep Method: EPA 5030

Sample #	Client ID	Batch #	Sampled	Extracted	Analyzed	Moisture
128926-006	U3WQ040401	33407	04/04/97	04/11/97	04/11/97	

Matrix: Water

Analyte	Units	128926-006
Diln Fac:		1
Gasoline	ug/L	<50
Surrogate		
Trifluorotoluene	%REC	79
Bromobenzene	%REC	84



Lab #: 128926

BATCH QC REPORT

TVH-Total Volatile Hydrocarbons	
Client: Kleinfelder	Analysis Method: CA LUFT (EPA 8015M)
Project#: 23-900026	Prep Method: EPA 5030
Location: TEAD Lust Sites	
METHOD BLANK	
Matrix: Water	Prep Date: 04/10/97
Batch#: 33407	Analysis Date: 04/10/97
Units: ug/L	
Diln Fac: 1	

MB Lab ID: QC43870

Analyte	Result	
Gasoline	<50	
Surrogate	%Rec	Recovery Limits
Trifluorotoluene	71	65-135
Bromobenzene	73	65-135



Lab #: 128926

BATCH QC REPORT

TVH-Total Volatile Hydrocarbons

Client: Kleinfelder
Project#: 23-900026
Location: TEAD Lust Sites

Analysis Method: CA LUFT (EPA 8015M)
Prep Method: EPA 5030

LABORATORY CONTROL SAMPLE

Matrix: Water
Batch#: 33407
Units: ug/L
Diln Fac: 1

Prep Date: 04/10/97
Analysis Date: 04/10/97

LCS Lab ID: QC43868

Analyte	Result	Spike Added	%Rec #	Limits
Gasoline	2154	2000	108	65-135
Surrogate	%Rec	Limits		
Trifluorotoluene	90	65-135		
Bromobenzene	102	65-135		

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

Spike Recovery: 0 out of 1 outside limits



Lab #: 128926

BATCH QC REPORT

TVH-Total Volatile Hydrocarbons	
Client: Kleinfelder	Analysis Method: CA LUPT (EPA 8015M)
Project#: 23-900026	Prep Method: EPA 5030
Location: TRAD Lust Sites	
MATRIX SPIKE/MATRIX SPIKE DUPLICATE	
Field ID: ZZZZZZ	Sample Date: 04/04/97
Lab ID: 128870-002	Received Date: 04/04/97
Matrix: Water	Prep Date: 04/11/97
Batch#: 33407	Analysis Date: 04/11/97
Units: ug/L	
Diln Fac: 1	

MS Lab ID: QC43871

Analyte	Spike Added	Sample	MS	%Rec #	Limits
Gasoline	2000	96.74	1987	95	65-135
Surrogate	%Rec	Limits			
Trifluorotoluene	88	65-135			
Bromobenzene	98	65-135			

MSD Lab ID: QC43872

Analyte	Spike Added	MSD	%Rec #	Limits	RPD #	Limit
Gasoline	2000	2042	97	65-135	3	20
Surrogate	%Rec	Limits				
Trifluorotoluene	88	65-135				
Bromobenzene	98	65-135				

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

RPD: 0 out of 1 outside limits

Spike Recovery: 0 out of 2 outside limits



TEH-Tot Ext Hydrocarbons

Client: Kleinfelder
Project#: 23-900026
Location: TEAD Lust Sites

Analysis Method: CA LUFT (EPA 8015M)
Prep Method: CA LUFT

Sample #	Client ID	Batch #	Sampled	Extracted	Analyzed	Moisture
128926-001	U3SP040402	33415	04/04/97	04/11/97	04/18/97	23%
128926-002	U3SP040502	33415	04/05/97	04/11/97	04/18/97	18%
128926-003	U3SP040702	33415	04/07/97	04/11/97	04/18/97	4%
128926-004	U3SP040803	33415	04/08/97	04/11/97	04/18/97	5%

Matrix: Soil

Analyte	Units	128926-001	128926-002	128926-003	128926-004
Diln Fac:		100	100	1	1
Kerosene C10-C16	mg/Kg	1800 YH	3300 YH	20 YH	<5.3
Diesel C12-C22	mg/Kg	7700	9200	88	<5.3
Surrogate					
Hexacosane	%REC	DO	DO	106	85

DO: Surrogate diluted out

Y: Sample exhibits fuel pattern which does not resemble standard

H: Heavier hydrocarbons than indicated standard



TEH-Tot Ext Hydrocarbons

Client: Kleinfelder
Project#: 23-900026
Location: TEAD Lust Sites

Analysis Method: CA LUFT (EPA 8015M)
Prep Method: CA LUFT

Sample #	Client ID	Batch #	Sampled	Extracted	Analyzed	Moisture
128926-007	U3SP040401	33415	04/04/97	04/11/97	04/18/97	17%
128926-008	U3SQ040401	33415	04/04/97	04/11/97	04/18/97	17%

Matrix: Soil

Analyte	Units	128926-007	128926-008
Diln Fac:		20	10
Kerosene C10-C16	mg/Kg	1400 YH	780 YH
Diesel C12-C22	mg/Kg	5700	3100
Surrogate			
Hexacosane	%REC	DO	DO

DO: Surrogate diluted out

Y: Sample exhibits fuel pattern which does not resemble standard

H: Heavier hydrocarbons than indicated standard

TEH-Tot Ext Hydrocarbons	
Client: Kleinfelder	Analysis Method: CA LUFT (EPA 8015M)
Project#: 23-900026	Prep Method: EPA 3520
Location: TEAD Lust Sites	

Sample #	Client ID	Batch #	Sampled	Extracted	Analyzed	Moisture
128926-006	U3WQ040401	33531	04/04/97	04/17/97	04/22/97	

Matrix: Water

Analyte	Units	128926-006
Diln Fac:		1
Kerosene C10-C16	ug/L	<250
Diesel C12-C22	ug/L	<250
Surrogate		
Hexacosane	%REC	111

Lab #: 128926

BATCH QC REPORT



Curtis & Tompkins, Ltd

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TEH-Tot Ext Hydrocarbons

Client: Kleinfelder
Project#: 23-900026
Location: TEAD Lust Sites

Analysis Method: CA LUFT (EPA 8015M)
Prep Method: CA LUFT

METHOD BLANK

Matrix: Soil
Batch#: 33415
Units: mg/Kg
Diln Fac: 1

Prep Date: 04/11/97
Analysis Date: 04/18/97

MB Lab ID: QC43901

Analyte	Result	
Kerosene C10-C16	<5.0	
Diesel C12-C22	<5.0	
Surrogate	%Rec	Recovery Limits
Hexacosane	97	65-135

Lab #: 128926

BATCH QC REPORT



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TEH-Tot Ext Hydrocarbons

Client: Kleinfelder
Project#: 23-900026
Location: TEAD Lust Sites

Analysis Method: CA LUFT (EPA 8015M)
Prep Method: EPA 3520

METHOD BLANK

Matrix: Water
Batch#: 33531
Units: ug/L
Diln Fac: 1

Prep Date: 04/17/97
Analysis Date: 04/22/97

MB Lab ID: QC44367

Analyte	Result	
Kerosene C10-C16	<250	
Diesel C12-C22	<250	
Surrogate	%Rec	Recovery Limits
Hexacosane	115	65-135



Lab #: 128926

BATCH QC REPORT

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TEH-Tot Ext Hydrocarbons

Client: Kleinfelder
Project#: 23-900026
Location: TEAD Lust Sites

Analysis Method: CA LUFT (EPA 8015M)
Prep Method: CA LUFT

LABORATORY CONTROL SAMPLE

Matrix: Soil
Batch#: 33415
Units: mg/Kg
Diln Fac: 1

Prep Date: 04/11/97
Analysis Date: 04/18/97

LCS Lab ID: QC43902

Analyte	Result	Spike Added	%Rec #	Limits
Diesel C12-C22	40.2	49.5	81	65-135
Surrogate	%Rec	Limits		
Hexacosane	110	65-135		

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

Spike Recovery: 0 out of 1 outside limits

Lab #: 128926

BATCH QC REPORT



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TEH-Tot Ext Hydrocarbons

Client: Kleinfelder
 Project#: 23-900026
 Location: TEAD Lust Sites

Analysis Method: CA LUFT (EPA 8015M)
 Prep Method: EPA 3520

BLANK SPIKE/BLANK SPIKE DUPLICATE

Matrix: Water
 Batch#: 33531
 Units: ug/L
 Diln Fac: 1

Prep Date: 04/17/97
 Analysis Date: 04/22/97

BS Lab ID: QC44368

Analyte	Spike Added	BS	%Rec #	Limits
Diesel C12-C22	2475	2192	89	65-135
Surrogate	%Rec,	Limits		
Hexacosane	112	65-135		

BSD Lab ID: QC44369

Analyte	Spike Added	BSD	%Rec #	Limits	RPD #	Limit
Diesel C12-C22	2475	2271	92	65-135	4	20
Surrogate	%Rec	Limits				
Hexacosane	116	65-135				

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

RPD: 0 out of 1 outside limits

Spike Recovery: 0 out of 2 outside limits

Lab #: 128926

BATCH QC REPORT



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TEH-Tot Ext Hydrocarbons

Client: Kleinfelder
 Project#: 23-900026
 Location: TEAD Lust Sites

Analysis Method: CA LUFT (EPA 8015M)
 Prep Method: CA LUFT

MATRIX SPIKE/MATRIX SPIKE DUPLICATE

Field ID: U3SP040702
 Lab ID: 128926-003
 Matrix: Soil
 Batch#: 33415
 Units: mg/Kg dry weight
 Diln Fac: 1

Sample Date: 04/07/97
 Received Date: 04/10/97
 Prep Date: 04/11/97
 Analysis Date: 04/18/97
 Moisture: 4%

MS Lab ID: QC43903

Analyte	Spike Added	Sample	MS	%Rec #	Limits
Diesel C12-C22	51.56	87.75	180.9	181 *	65-135
Surrogate	%Rec	Limits			
Hexacosane	122	65-135			

MSD Lab ID: QC43904

Analyte	Spike Added	MSD	%Rec #	Limits	RPD #	Limit
Diesel C12-C22	51.56	163.4	147 *	65-135	103 *	35
Surrogate	%Rec	Limits				
Hexacosane	103	65-135				

Column to be used to flag recovery and RPD values with an asterisk
 * Values outside of QC limits
 RPD: 1 out of 1 outside limits
 Spike Recovery: 2 out of 2 outside limits

SAMPLE ID: U3SP040402
 LAB ID: 128926-001
 CLIENT: Kleinfelder
 PROJECT ID: 23-900026
 LOCATION: TEAD Lust Sites
 MATRIX: Soil
 MOISTURE: 23%

DATE SAMPLED: 04/04/97
 DATE RECEIVED: 04/10/97
 DATE REPORTED: 04/28/97

Metals Analytical Report

Compound	Result (mg/Kg*)	Reporting Limit (mg/Kg*)	IDF	QC Batch	Method	Analysis Date
Iron	6100	6.5	1	33446	EPA 6010A	04/16/97
* = Dry weight basis						



Curtis & Tompkins, Ltd

CLIENT: Kleinfelder
JOB NUMBER: 128926

DATE REPORTED: 04/28/97

BATCH QC REPORT
PREP BLANK

Compound	Result	Reporting Limit	Units	IDF	QC Batch	Method	Analysis Date
Iron	ND	5	mg/Kg	1	33446	EPA 6010A	04/16/97

ND = Not Detected at or above reporting limit

CLIENT: Kleinfelder
JOB NUMBER: 128926

DATE REPORTED: 04/28/97

BATCH QC REPORT
BLANK SPIKE / BLANK SPIKE DUPLICATE

Compound	Spike Amount	BS Result	BSD Result	Units	BS% Rec.	BSD% Rec.	Rec. Limits	RPD %	RPD Limit	QC Batch	Method	Analysis Date
Iron	50	47.54	44.49	mg/Kg	95	89	80-120	7	35	33446	EPA 6010A	04/16/97

CLIENT: Kleinfelder
JOB NUMBER: 128926

DATE REPORTED: 04/28/97

BATCH QC REPORT
SAMPLE DUPLICATE

Compound	Sample	Sample Result	Duplicate Result	Units	RPD %	RPD Limit	QC Batch	Method	Analysis Date
Iron	128926-001	6131	5504	mg/Kg	11	35	33446	EPA 6010A	04/16/97

CLIENT: Kleinfelder
JOB NUMBER: 128926

DATE REPORTED: 04/28/97

**BATCH QC REPORT
SAMPLE SPIKE**

Compound	Spike Amount	Sample	Sample Result	Spike Result	Units	Percent Rec.	Rec. Limit	QC Batch	Method	Analysis Date
Iron	63.99	128926-001	6131	6097	mg/Kg	-52* NM	65-135	33446	EPA 6010A	04/16/97

* = Out of Limits
NM = Not Meaningful

LABORATORY NUMBER: 128926
 CLIENT: KLEINFELDER
 PROJECT: TEAD Lust Sites
 PROJECT ID: 23-900026

DATE SAMPLED: 04/04/97
 DATE RECEIVED: 04/10/97
 DATE ANALYZED: 04/23/97
 BATCH#: 33605

=====

ANALYSIS: TOTAL KJELDAHL NITROGEN
 ANALYSIS METHOD: EPA 351.4

=====

LAB ID	SAMPLE ID	RESULT*	UNITS	REPORTING LIMIT
128926-001	U3SP040402	160	mg/Kg	130
METHOD BLANK	N/A	ND	mg/Kg	1.0

* = Dry-weight basis.

ND = Not detected at or above the reporting limit.

QA/QC SUMMARY: MS/MSD OF SAMPLE 128970-004.

=====

RPD, %	2
RECOVERY, %	70

=====

Analytical Results
for
Curtis & Tompkins, Ltd.
Client Reference: 128926
Clayton Project No. 97041.37

Sample Identification: See Below
Lab Number: 9704137
Sample Matrix/Media: SOIL
Method Reference: EPA 353.2

Date Received: 04/11/97
Date Analyzed: 04/17/97

Lab Number	Sample Identification	Date Sampled	Nitrate-N (mg/kg)	Method Detection Limit (mg/kg)
-01	U3SP040402	04/04/97	<0.5	0.5
-02	METHOD BLANK	--	<0.5	0.5

ND: Not detected at or above limit of detection
--: Information not available or not applicable

Results are reported on a wet-weight basis, as received.

APPENDIX D

DATA VERIFICATION SUMMARY REPORT

**DATA VERIFICATION SUMMARY REPORT
BUILDING 637 NORTH LUST SITE
TOOELE ARMY DEPOT, UTAH**

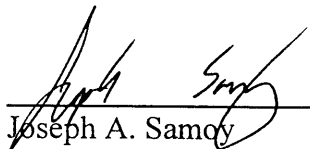
December 30, 1997

A Report Prepared for:

Department of the Army
Sacramento District
US Army Corps of Engineers
1325 J Street
Sacramento, CA 95814-2922


**DATA VERIFICATION SUMMARY REPORT
BUILDING 637 NORTH LUST SITE
TOOELE ARMY DEPOT, UTAH**

Kleinfelder Job No.: 23-900023-A13
Prepared by:



Joseph A. Samoy
Staff Chemist

Reviewed by:



Italy E. Pittman
Project Chemist

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December 30, 1997

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1. SUMMARY

This report documents the review of the analytical data associated with the Building 637 North LUST Site at the Tooele Army Depot (TEAD) in Tooele, Utah.

The soil and aqueous samples were collected by Kleinfelder and were analyzed for metals, total volatile hydrocarbons (TVH), total extractable hydrocarbons, volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), and general minerals by Curtis & Thompkins, Ltd. (C&T) located in Berkeley, California.

The environmental samples and Quality Control (QC) data have been evaluated according to the specifications stated in the Quality Assurance Project Plan (QAPP) for the Building 637N, 637SW, 637SE, and 691 LUST Sites; the USACE Attachment B; the prevalent EPA SW-846 analytical methods; the USEPA CLP National Functional Guidelines for Organic Data Review, 1994 Revision; and the USEPA CLP National Functional Guidelines for Inorganic Data Review, 1994 Revision.

The analytical data and other information contained within the data packages associated with this report have undergone review to evaluate the level of accuracy, precision and completeness. All of the C&T analytical data were verified by Kleinfelder and validated by the Sacramento District, USACE.

C&T demonstrated that the required target analytes were accurately identified and quantified. Small inconsistencies with the project QAPP as related to QC requirements and non-compliance have resulted in the qualification of a small number of sample results. Based on the review, the overall quality for the laboratory work provided by C&T appears to be acceptable.

2. INTRODUCTION

2.1 OBJECTIVE

This Data Verification Summary Report has been generated to document that Kleinfelder has examined the data contained within the data packages for the samples associated with the installation of the monitoring well, C-16, and the venting well, VW-1, at the Building 637N LUST Site at TEAD, and to check that the work performed met the requirements set forth in the QAPP for the LUST sites.

2.2 APPROACH

The analytical data were reviewed and QC measures were evaluated according to the specifications stated in the QAPP for the Building 637N, 637SW, 637SE, and 691 LUST Sites; the USACE Attachment B; the prevalent EPA SW-846 analytical methods; and USEPA CLP National Functional Guidelines for Organic and Inorganic Data Review, 1994 Revision.

The C&T data were verified by Kleinfelder and validated by the USACE. The sample information from C&T is listed in Table 1. Field Duplicate Results are presented on Table 2; analytical results are presented on Tables 3 through 5; and qualified analytical results are presented on Table 6.

The following documents were referenced as part of this review:

- Quality Assurance Project Plan, Building 637N, 637SW, 637SE and 691 LUST Sites - Tooele Army Depot, February, 1997
- Analytical Data Reports (See Section 7)
- United States Army Corps of Engineers, Attachment B
- United States Environmental Protection Agency, SW-846 - Test Methods, 3rd Edition
- USEPA CLP National Functional Guidelines for Inorganic Data Review, 1994 Revision.
- USEPA CLP National Functional Guidelines for Organic Data Review, 1994 Revision

3. BACKGROUND

Soil and groundwater samples were collected at the Building 637N LUST Site during April and May, 1997. The samples were collected and analyzed to provide data of known quality to assess the nature and concentrations of contamination in soil and groundwater. The data will be used to evaluate whether soil from the well borings or groundwater from the completed well have hazardous characteristics or contain hazardous constituents, and to evaluate disposal options (if needed) of the generated wastes.

To characterize the samples, the following analytical methods were used for this project:

- EPA Method 300.0 (chloride, nitrate, and sulfate)
- EPA Method 310.1 (bicarbonate, carbonate and hydroxide)
- EPA Method 365.2 (total phosphorus)
- EPA Method 351.4 (total kjeldahl nitrogen)
- EPA Method 6010A (calcium, iron, magnesium, potassium, and sodium)
- EPA Methods M8015/5030 (TVH)
- EPA Methods M8015/3550/3510/3520 (TEH)
- EPA Method 8260 (VOCs)
- EPA Method 8270A (SVOCs)

4. SAMPLE ANALYSIS

4.1 SAMPLE CONTROL SUMMARY

4.1.1 Sample Receipt

Eight soil, seven aqueous, and three QC samples were collected by Kleinfelder, and received by C&T between April 10 and June 3, 1997. Cooler receipt forms were included in all the final reports, and no cooler temperature anomalies were noted on the cooler receipt forms.

4.1.2 Holding Times

The sample analyzed for nitrate (as nitrogen) was delivered to C&T outside the analytical holding time. The sample was analyzed eleven days past holding time. Nitrate (as N) was not detected in the sample above the reporting limit; therefore the sample (U3SP-0404-01) result for nitrate (as N) is qualified as "R."

Sample U3WP-0512-01 was analyzed for gasoline past holding time; therefore the result for gasoline is qualified as "UJ".

All other extraction and analytical holding times were met for the analyses performed.

4.2 QUALITY ASSURANCE / QUALITY CONTROL OBJECTIVES

4.2.1 Instrument Performance

Instrument checks are performed to ensure that the instrument is capable of producing acceptable, identifiable, and quantifiable data. Instrument performance was reviewed based on the initial and continuing calibration data and tune information (Methods 8260 and 8270A only) provided.

4.2.2 Precision and Accuracy

All of the analytical data were reviewed for precision and accuracy. Precision was based on the Relative Percent Difference (RPD) values between matrix spike/matrix spike duplicates

(MS/MSD). The assessment of accuracy was based on the percent recovery values in the MS, MSD, LCS, and surrogate data.

A matrix spike is a primary sample spiked with target compounds. A LCS is a laboratory-prepared blank matrix sample, spiked with target compounds. A surrogate is a compound spiked into the sample that is uncommon in the environment but which is appropriate to the method being used and provides information about the environmental sample matrices.

4.2.3 Field / Laboratory Cross Contamination

The analytical data were reviewed for possible field and/or laboratory cross contamination based on the blank data. Rinse blanks are collected to monitor the decontamination of field equipment. Trip blanks are laboratory-prepared blanks transported with the primary groundwater samples to monitor field, sample transport, and laboratory activities. A method blank is a laboratory-prepared blank matrix sample included in all preparation or analytical batches to monitor laboratory activities.

4.3 ANALYTICAL DATA EVALUATION

C&T reported all soil results on a dry weight basis.

4.3.1 General Minerals by EPA Methods 300.0, 310.0, and 6010A

C&T performed cations (calcium, magnesium, potassium and sodium) analysis by Inductively Coupled Plasma Spectroscopy (ICP) using EPA Method 6010A; total alkalinity analyses (bicarbonate, carbonate, and hydroxide) by spectrophotometer using EPA Method 310.1; total phosphorus analysis by spectrophotometer using EPA Method 365.2; and total kjeldahl nitrogen (TKN) analysis by spectrophotometer using EPA Method 351.4. C&T subcontracted chloride, nitrate and sulfate analysis to Clayton Environmental (Clayton) located in Pleasanton, California. Clayton performed chloride, nitrate, and sulfate analysis by ion chromatography using EPA Method 300.0.

Initial and Continuing Calibration

The correlation coefficient for the initial calibration was above 0.995 and the recoveries for the continuing calibration verification standards (CCVs) were within acceptance criteria.

Sample and QC Data

Sample U3SP-0404-02 was analyzed for nitrate (as N) past holding time, as discussed in Section 4.1.2. There are no other problems to report with the general minerals analysis.

4.3.2 Iron by EPA Method 6010A

C&T performed iron analysis by ICP using EPA Method 6010A.

Initial and Continuing Calibration

All initial and continuing calibrations met acceptance criteria.

Sample and QC Data

The MS recovery for iron was above the acceptance criteria; therefore, the associated sample result is accepted with a J qualifier. The qualified result is listed in Table 5 of this report. There were no other problems with the samples analyzed for iron.

4.3.3 Total Volatile Hydrocarbons by EPA Methods M8015/5030

C&T performed TVH extraction by purge and trap using EPA Method 5030 and TVH analysis by Gas Chromatography (GC) using EPA Method M8015.

Initial and Continuing Calibration

There were no problems with the initial and continuing calibrations that warrant the qualification of sample results.

Sample and QC Data

Sample U3WP-0512-01 was analyzed for gasoline past holding time, as discussed in Section 4.1.2.

The MS recovery in SDG 128926 was outside the acceptance criteria for gasoline; therefore associated sample results are accepted with a J qualifier.

A number of samples had surrogate recoveries outside the acceptance criteria; therefore the results for these samples are qualified as "UJ/J." There were no problems with the soil and water samples analyzed by EPA Method M8015/5030.

4.3.4 Total Extractable Hydrocarbons by EPA Methods M8015, 3550, 3510 and 3520

C&T extracted soil samples for TEH by sonication using EPA Method 3550, and extracted water samples by separatory-funnel using EPA Method 3510 or liquid-liquid using EPA Method 3520. Soil and water samples were analyzed for TEH by GC using EPA Method M8015.

Initial and Continuing Calibration

A single point calibration was performed for kerosene. This non-compliance issue does not impact the overall quality, since kerosene was not detected above the reporting limits in the associated samples. Five point initial calibrations were performed for diesel, with all initial calibrations within acceptance criteria.

There were no other problems with the initial and continuing calibrations.

Sample and QC Data

The recoveries and the RPD for diesel in the MS and MSD performed for the samples in SDG 128926 were outside acceptance criteria. Therefore, the associated sample results are accepted with a UJ/J qualifier.

The surrogate recoveries for a number a samples were outside acceptance criteria, due to the high concentration of hydrocarbons in the samples. To retain results within the calibration range, it was necessary to dilute these samples, which diluted out the surrogates. The results for these samples are accepted without qualification.

Several samples contain hydrocarbons identified by C&T as "diesel," but the hydrocarbon pattern does not resemble diesel. Therefore, the results for these samples are accepted with an N qualifier.

There were no other problems with the soil and water samples analyzed by EPA Method M8015 for TEH.

4.3.5 Volatile Organic Compounds by EPA Method 8260

C&T performed VOC analysis by Gas Chromatography / Mass Spectroscopy (GC/MS) using EPA Method 8260.

Initial and Continuing Calibration

All bromofluorobenzene tunes performed were within acceptance criteria. Methyl tert-butyl ether (MTBE) was not included in the initial and continuing calibrations performed for the samples in sample delivery groups (SDGs) 128926, 129063, and 129292.

A tentatively identified compound (TIC) search was performed on the associated samples and MTBE was not detected in the samples above the reporting limit. Since, the reporting limit is an estimation, associated MTBE results are accepted with a UJ qualifier.

In addition, gasoline along with benzene, ethylbenzene, and total xylenes (the main constituents of gasoline besides MTBE) were not detected in the samples above the reporting limit. Therefore, this laboratory non-conformance issue does not affect the overall usability of the data.

There were no other problems with the initial and continuing calibrations that warrant the qualification of sample results.

Sample and QC Data

The reporting limits for samples U3SP-0404-02, U3SP-0405-02, and U3SQ-0404-01 were raised due to high levels of VOCs.

Trip blanks were not included with the samples submitted to C&T on April 25, May 15, and June 4, 1997. Therefore, associated samples with analyte concentrations above the detection limits are qualified as UJ/J.

4.3.6 Semi-Volatile Organic Compounds by EPA Method 8270A

C&T performed SVOC analysis by GC/MS using EPA Method 8270A.

Initial and Continuing Calibration

All decafluorotriphenylphosphine tunes met acceptance criteria. There were no problems with the initial and continuing calibrations that warrant the qualification of sample results.

Sample and QC Data

There were no problems with the soil and water samples analyzed by EPA Method 8270A.

4.4 QUALITY ASSURANCE SUMMARY

One field duplicate soil sample was collected by Kleinfelder and sent to C&T for TVH, TEH, VOC, and SVOC analyses. The TVH and TEH results in the primary sample were much greater than the results in the field duplicate, and the RPDs are greater than the intralaboratory control limits of 35%.

Due to the non-homogeneous nature of soil samples, laboratory variability is a common occurrence, and the out-of-control RPD does not impact the overall quality of the data. The overall QA results for C&T provided analytical data with a reliable level of precision.

4.5 DATA VALIDATION

As of this report date, the validation report from the USACE is not available.

5. CONCLUSIONS

The analytical data for this project met most of the requirements specified in the QAPP. The minimum requirements for LCS, blank, and MS/MSD samples were met. The QC analyses performed provide a sound basis for fair analytical data. The quality of QC data demonstrates that analytical accuracy and precision are acceptable. The required detection limits were met according to the requirements listed in the QAPP, with a few exceptions due to high concentrations of target compounds or matrix interference.

The samples were extracted and analyzed within the defined analytical holding time, except for one sample analyzed for nitrate and one sample analyzed for gasoline. These non-compliance issues warranted the rejection of the nitrate result for one sample and the qualification of one gasoline result.

There were no problems with the physical conditions of the samples or the temperatures of the coolers at the times of sample receipt.

Trip blanks were not delivered with the samples on three different occasions, which warranted the qualification of a number of VOC results. There were no analytes detected above the reporting limits in the rinseate, trip, or method blanks analyzed by C&T.

The overall representativeness and completeness of the analytical effort for analyses provided by C&T for the Building 637N LUST Site appears to be acceptable. The deficiencies listed in this report are not considered significant enough to be cause for serious concern. The laboratory demonstrated that the required target analytes were accurately identified and quantified. In our opinion, the analytical results are deemed acceptable and useable with the attached qualifications.

6. REFERENCES

1. National Functional Guidelines for Inorganic Data Review, US Environmental Protection Agency, Contract Laboratory Program, EPA-540/R-94/013, February 1994.
2. National Functional Guidelines for Organic Data Review, US Environmental Protection Agency, Contract Laboratory Program, EPA-540/R-94/012, February 1994.
3. Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, US Environmental Protection Agency, SW-846, 3rd Edition, September 1986, Update I, July 1992 and Update II, September 1994.
4. Statement of Work for Inorganic Analysis, US Environmental Protection Agency, Contract Laboratory Program, ILM04.0, August 1994.
5. Statement of Work for Organic Analysis, US Environmental Protection Agency, Contract Laboratory Program, EPA-540/R-94/073, OLM03.1, August 1994.
6. Quality Assurance Project Plan, LUST Sites, Tooele Army Depot, Utah, "Project Workplans, Additional Subsurface Characterization, Building 637-N, 637-SW, 637-SE and 691 LUST Sites - Tooele Army Depot, Utah," February 28, 1997.
7. Ft. Huachuca Remedial Investigation at Group B, C, and E Sites, Scope of Work, Attachment B, "Environmental Data Quality Management."

7. ANALYTICAL DATA REPORTS

- 1, Curtis & Thompkins, Ltd., May 1997.
- 2, Curtis & Thompkins, Ltd., May 1997.
- 3, Curtis & Thompkins, Ltd., June 1997.
- 4, Curtis & Thompkins, Ltd., June 1997.
- 5, Curtis & Thompkins, Ltd., June 1997.

APPENDIX E

USACE DATA VALIDATION REPORT

DATA VERIFICATION REPORT VOLATILE ORGANIC COMPOUNDS

Project Name: Tooele Army Depot
USACE Prime Contractor: Kleinfelder
Laboratory: Curtis & Tompkins, Ltd.
 Mountain States Analytical
Sample Delivery Groups: 128573, 128636, 128696, 128788, 128828,
 128926, 129063, 129124, 129265, 129292,
 129358, 129503, KAI-115
Analysis: Volatile Organic Compounds by Method SW8260
Review Guideline Source Document: USEPA CLP National Functional Guidelines for
 Organic Data Review, 1994 Revision
EPA QC Level: Level III

Field ID	Laboratory ID	Matrix	Analysis
U4SP-0307-01	128573-001	Soil	Volatile Organic Compounds
U4SP-0307-02	128573-002	Soil	Volatile Organic Compounds
U4SP-0307-03	128573-003	Soil	Volatile Organic Compounds
U4SP-0307-04	128573-004	Soil	Volatile Organic Compounds
U4SP-0307-05	128573-005	Soil	Volatile Organic Compounds
U4SQ-0307-01	128573-006	Soil	Volatile Organic Compounds
U4WQ-0307-01	128573-007	Water	Volatile Organic Compounds
U4SP-0310-01	128573-008	Soil	Volatile Organic Compounds
U4SP-0312-01	128636-001	Soil	Volatile Organic Compounds
U4WQ-0313-01	128636-002	Water	Volatile Organic Compounds
U2SP-0318-01	128696-001	Soil	Volatile Organic Compounds
U2SP-0319-01	128696-002	Soil	Volatile Organic Compounds
U2SP-0319-02	128696-003	Soil	Volatile Organic Compounds
U2WQ-0319-01	128696-004	Water	Volatile Organic Compounds
TRIP BLANK	128696-005	Water	Volatile Organic Compounds
ULSP-0322-01	128788-001	Soil	Volatile Organic Compounds
ULSP-0322-04	128788-002	Soil	Volatile Organic Compounds
ULSP-0323-01	128788-003	Soil	Volatile Organic Compounds
V1WQ-0322-01	128788-004	Water	Volatile Organic Compounds
TRIP BLANK	128788-005	Water	Volatile Organic Compounds
ULSP-0325-03	128788-006	Soil	Volatile Organic Compounds
U4WP-0329-01	128828-001	Water	Volatile Organic Compounds
TRIP BLANKS	128828-002	Water	Volatile Organic Compounds

Field ID	Laboratory ID	Matrix	Analysis
U3SP-0404-02	128926-001	Soil	Volatile Organic Compounds
U3SP-0405-02	128926-002	Soil	Volatile Organic Compounds
U3SP-0407-02	128926-003	Soil	Volatile Organic Compounds
U3SP-0408-03	128926-004	Soil	Volatile Organic Compounds
U3WQ-0403-01	128926-005	Water	Volatile Organic Compounds
U3WQ-0404-01	128926-006	Water	Volatile Organic Compounds
U3SP-0404-01	128926-007	Soil	Volatile Organic Compounds
U3SQ-0404-01	128926-008	Soil	Volatile Organic Compounds
U3SP-0415-01	129063-001	Soil	Volatile Organic Compounds
U3W2-0415-01	129063-002	Water	Volatile Organic Compounds
U3SP-0418-01	129063-003	Soil	Volatile Organic Compounds
U3SP-0418-02	129063-004	Soil	Volatile Organic Compounds
U3SP-0417-01	129063-005	Soil	Volatile Organic Compounds
U1SP-0428-01	129124-001	Soil	Volatile Organic Compounds
U1WQ-0428-01	129124-002	Water	Volatile Organic Compounds
U2WQ-0505-01	129265-001	Water	Volatile Organic Compounds
U2SP-0507-01	129265-002	Soil	Volatile Organic Compounds
U2SP-0507-03	129265-004	Soil	Volatile Organic Compounds
U3WP-0512-01	129292-001	Water	Volatile Organic Compounds
U1WP-0513-01	129292-005	Water	Volatile Organic Compounds
U2WQ-0520-01	129358-001	Water	Volatile Organic Compounds
U2WP-0520-01	129358-002	Water	Volatile Organic Compounds
U2WQ-0520-02	129358-006	Water	Volatile Organic Compounds
U1WQ-0603-01	129503-001	Water	Volatile Organic Compounds
U1AP-0603-01	129503-002	Water	Volatile Organic Compounds
U1SP-0322-02	60653V	Soil	Volatile Organic Compounds
U1SP-0325-02	60654V	Soil	Volatile Organic Compounds

INTRODUCTION

This verification report assesses the analytical data quality of the analyses listed on the preceding cover page. Samples were analyzed for volatile organic compounds in accordance with *USEPA Method SW8240*. The review criteria employed in the generation of this report is based on the QC requirements contained in the analytical method and the *Quality Assurance Project Plan (QAPjP)*, February 1997 revision; the review procedure is consistent with *USEPA CLP National Functional Guidelines for Organic Data Review*, 1994 Revision to the extent possible. In cases where two qualifiers are listed as an action, such as "J/UJ", the first qualifier applies to positive results, and the second to non-detect results. In areas where definitive guidance is not provided in either *Functional Guidelines* or the *QAPjP*, data has been evaluated in a conservative manner using professional judgment.

I. HOLDING TIMES

Objective: The validity of results is ascertained based on the holding time of the sample from time of collection to time of sample extraction and analysis.

Evaluation: Holding times were determined by comparing the sampling date on the chain of custody records with the dates of analysis found on the Form I summaries. Samples were received properly preserved and refrigerated. The chain of custody records were complete and in agreement with the laboratory sample lists. All technical holding times were met.

Action: No qualifiers should be applied.

II. GC/MS INSTRUMENT PERFORMANCE CHECK

Objective: GC/MS instrument performance checks are performed to ensure mass resolution, identification, and to some degree, sensitivity. These criteria are not sample specific. Conformance is determined using standard materials; therefore, these criteria should be met in all circumstances.

Evaluation: Instrument performance checks were performed for each 12 hour period in which samples were analyzed.

Action: No qualifiers should be applied.

III. INITIAL CALIBRATION

Objective: Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data for compounds on the volatile Target Compound List (TCL). Initial calibration demonstrates that the instrument is capable of acceptable performance and of producing a linear calibration curve.

Evaluation: Reported results were evaluated to determine compliance with the required acceptance criteria.

Initial calibrations were performed in accordance with the method. All RRFs and RSD values were within control limits, with the exception of those shown in the following table.

Date	Analyte	%RSD	Criteria	Action	Associated Samples
3-31-97	Acetone	37	<30%	J/None	U4WP-0329-01, TRIP BLANKS
3-21-97	Acetone	33	<30%	J/None	U1SP-0325-02
5-15-97	Bromomethane	34	<30%	J/None	U2WQ-0505-01

Action: Qualifiers should be applied as indicated in the preceding table.

IV. CONTINUING CALIBRATION

Objective: Compliance requirements for satisfactory continuing calibration are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data for volatile target compounds at the beginning of the analytical sequence. The continuing calibration establishes the 12 hour relative response factors on which the quantitations are based and demonstrates satisfactory performance of the instrument on a day to day basis.

Evaluation: Reported results were evaluated to determine compliance with the required acceptance criteria.

Continuing calibrations were performed in accordance with the method. All calibration factors and %D values were within control limits, with the exception of those shown in the following table.

Date	Compound	%D	Criteria	Action	Associated Samples
4/1/97	Acetone	+67	<25%	J/None	U1SP-0322-02
4/11/97	Naphthalene	-45	<25%	J/UJ	U3SP-0407-02, U3SP-0408-03, U3WQ-0403-01, U3WQ-0404-01

Action: Results for compounds demonstrating increased sensitivity from the initial calibration are considered estimated with a potential high bias; those demonstrating decreased sensitivity are considered estimated with a potential low bias. Qualifiers should be applied as indicated in the preceding table.

V. BLANKS

Objective: The purpose of laboratory and field blanks is to determine the existence and magnitude of contamination problems resulting from laboratory and field activities. The criteria for evaluation of blanks apply to any blank associated with the samples (e.g., method blanks, instrument blanks, trip blanks, and equipment blanks). If problems exist with any blank, all associated data must be carefully evaluated to determine whether or not there is an inherent variability in the data, or if the problem is an isolated occurrence not affecting other data.

Evaluation: Reported results were evaluated to determine compliance with the required acceptance criteria.

Method blank analyses were performed appropriately for this data set. No target compounds were reported in the blanks.

Action: No qualifiers should be applied.

VI. SURROGATE SPIKES

Objective: Method performance for individual samples is demonstrated through spiking activities. All samples are spiked with surrogate compounds prior to sample preparation. The sample itself may produce effects due to such factors as interferences and high concentrations of analytes.

Evaluation: Reported results were evaluated to determine compliance with the required acceptance criteria.

All surrogate recoveries were within control limits, with the exception of those shown in the following table.

Sample	Surrogate	%Rec.	Control Limits	Action
U2SP-0318-01	Bromofluorobenzene	227%	59-113	J/None

Action: Qualifiers should be applied as indicated in the preceding table.

VII. MATRIX SPIKES/MATRIX SPIKE DUPLICATES

Objective: Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information.

Evaluation: Reported results were evaluated to determine compliance with the required acceptance criteria.

Matrix spikes and matrix spike duplicates were analyzed at the appropriate frequency. All recoveries and RPD values were within control limits.

Action: No qualifiers should be applied.

VIII. LABORATORY CONTROL SAMPLES

Objective: Data for laboratory control samples are generated to provide information on the accuracy of the analytical method and on the laboratory performance.

Evaluation: Reported results were evaluated to determine compliance with the required acceptance criteria.

Laboratory control samples were analyzed at the appropriate frequency. All recoveries were within control limits.

Action: No qualifiers should be applied.

IX. REGIONAL QUALITY ASSURANCE AND QUALITY CONTROL

Not applicable to this SDG

X. INTERNAL STANDARDS

Objective: Internal standard performance criteria ensure that GC/MS sensitivity and response are stable during every analytical run sequence.

Evaluation: Reported results were evaluated to determine compliance with the required acceptance criteria.

All internal standard area counts and retention times were within the established control limits.

Action: No qualifiers should be applied.

XI. TENTATIVELY IDENTIFIED COMPOUNDS

Objective: Chromatographic peaks in volatile fraction analyses that are not target analytes, surrogates, or internal standards are potential tentatively identified compounds (TICs). TICs must be qualitatively identified by a National Institute of Standards and Testing (NIST) mass spectral library search and the identifications assessed by the data reviewer.

Evaluation: TICs were not included with this SDG.

Action: None.

XII. COMPOUND QUANTITATION AND REPORTED CRQLs

Objective: Careful evaluation is required to ensure that the reported quantitation results and contract required quantitation limits (CRQLs) for target compounds are accurate.

Evaluation: Quantitation reports and sample preparation sheets were examined for all samples to verify the reported results and quantitation limits.

No errors or other discrepancies were found with the exception of the reporting limit for dibromochloromethane for the water analysis. The QAPjP specifies 10 ug/L, whereas the contract laboratory used 50 ug/L. Furthermore, the analyte 2-chloroethylvinylether is listed in the QAPjP, but not reported by the lab.

Action: No qualifiers should be applied but the data user should be aware of these deviations from QAPjP requirements.

OVERALL DATA ASSESSMENT

Out of control events experienced by the laboratory have warranted the qualification of a minimal portion of the data set. The deficiencies described in this report are not considered cause for serious concern with regard to the laboratory's ability to identify and quantify the required target analytes. Based on the information evaluated, the overall quality of the data appears to be good.

**DATA VERIFICATION REPORT
SEMIVOLATILE ORGANIC COMPOUNDS**

Project Name: Tooele Army Depot

USACE Prime Contractor: Kleinfelder

Laboratory: Curtis & Tompkins, Ltd.

Sample Delivery Groups: 128926, 129063, 129292, 129358

Analysis: Semivolatile Organic Compounds by Method SW8270

Review Guideline Source Document: USEPA CLP National Functional Guidelines for Organic Data Review, 1994 Revision

EPA QC Level: Level III

Field ID	Laboratory ID	Matrix	Analysis
U3SP-0404-02	128926-001	Soil	Semivolatile Organic Compounds
U3SP-0405-02	128926-002	Soil	Semivolatile Organic Compounds
U3SP-0407-02	128926-003	Soil	Semivolatile Organic Compounds
U3SP-0408-03	128926-004	Soil	Semivolatile Organic Compounds
U3WQ-0404-01	128926-006	Water	Semivolatile Organic Compounds
U3SP-0404-01	128926-007	Soil	Semivolatile Organic Compounds
U3SQ-0404-01	128926-008	Soil	Semivolatile Organic Compounds
U3SP-0415-01	129063-001	Soil	Semivolatile Organic Compounds
U3SP-0418-01	129063-003	Soil	Semivolatile Organic Compounds
U3SP-0418-02	129063-004	Soil	Semivolatile Organic Compounds
U3SP-0417-01	129063-005	Soil	Semivolatile Organic Compounds
U3WP-0512-02	129292-002	Water	Semivolatile Organic Compounds
U2WP-0520-03	129358-004	Water	Semivolatile Organic Compounds

INTRODUCTION

This verification report assesses the analytical data quality of the analyses listed on the preceding cover page. Samples were analyzed for semivolatile organic compounds in accordance with *USEPA Method SW8270*. The review criteria employed in the generation of this report is based on the QC requirements contained in the analytical method and the *Quality Assurance Project Plan (QAPjP)*, February 1997 revision; the review procedure is consistent with *USEPA CLP National Functional Guidelines for Organic Data Review*, 1994 Revision to the extent possible. In cases where two qualifiers are listed as an action, such as "J/UJ", the first qualifier applies to positive results, and the second to non-detect results. In areas where definitive guidance is not provided in either *Functional Guidelines* or the *QAPjP*, data has been evaluated in a conservative manner using professional judgment.

I. HOLDING TIMES

Objective: The validity of results is ascertained based on the holding time of the sample from time of collection to time of sample extraction and analysis.

Evaluation: Holding times were determined by comparing the sampling date on the chain of custody records with the dates of analysis found on the Form I summaries. Samples were received properly preserved and refrigerated. The chain of custody records were complete and in agreement with the laboratory sample lists. With the exception of those shown in the following table, technical holding times were met for all samples.

Sample ID	Time to Analysis	Criteria	Action
U3WQ-0404-01	10 days	7 days	J/UJ

Action: Qualifiers should be applied as indicated in the preceding table.

II. GC/MS INSTRUMENT PERFORMANCE CHECK

Objective: GC/MS instrument performance checks are performed to ensure mass resolution, identification, and to some degree, sensitivity. These criteria are not sample specific. Conformance is determined using standard materials; therefore, these criteria should be met in all circumstances.

Evaluation: Instrument performance checks were performed for each 12 hour period in which samples were analyzed.

Action: No qualifiers should be applied.

III. INITIAL CALIBRATION

Objective: Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data for compounds on the semivolatile Target Compound List (TCL). Initial calibration demonstrates that the instrument is capable of acceptable performance and of producing a linear calibration curve.

Evaluation: Reported results were evaluated to determine compliance with the required acceptance criteria.

Initial calibrations were performed in accordance with the method. All RRFs and RSD values were within control limits.

Action: No qualifiers should be applied.

IV. CONTINUING CALIBRATION

Objective: Compliance requirements for satisfactory continuing calibration are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data for semivolatile target compounds at the beginning of the analytical sequence. The continuing calibration establishes the 12 hour relative response factors on which the quantitations are based and demonstrates satisfactory performance of the instrument on a day to day basis.

Evaluation: Reported results were evaluated to determine compliance with the required acceptance criteria.

Continuing calibrations were performed in accordance with the method. All RRFs and %D values were within control limits.

Action: No qualifiers should be applied.

V. BLANKS

Objective: The purpose of laboratory and field blanks is to determine the existence and magnitude of contamination problems resulting from laboratory and field activities. The criteria for evaluation of blanks apply to any blank associated with the samples (e.g., method blanks, instrument blanks, trip blanks, and equipment blanks). If problems exist with any blank, all associated data must be carefully evaluated to determine whether or not there is an inherent variability in the data, or if the problem is an isolated occurrence not affecting other data.

Evaluation: Reported results were evaluated to determine compliance with the required acceptance criteria.

Method and instrument blank analyses were performed appropriately. No target compounds were reported in the blanks. The base/neutral fraction of the method blank for SDG 129358 was lost during the concentration step. However, this does not significantly affect the data since no base/neutral target compounds were detected in the associated sample.

Action: No qualifiers should be applied.

VI. SURROGATE SPIKES

Objective: Method performance for individual samples is demonstrated through spiking activities. All samples are spiked with surrogate compounds prior to sample preparation. The sample itself may produce effects due to such factors as interferences and high concentrations of analytes.

Evaluation: Reported results were evaluated to determine compliance with the required acceptance criteria.

All surrogate recoveries were within control limits.

Action: No qualifiers should be applied.

VII. MATRIX SPIKES/MATRIX SPIKE DUPLICATES

Objective: Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information.

Evaluation: Reported results were evaluated to determine compliance with the required acceptance criteria.

Matrix spikes and matrix spike duplicates for the soil analysis were analyzed at the appropriate frequency. All recoveries and RPD values were within control limits.

Matrix spikes were not performed for the water analysis.

Action: No qualifiers should be applied.

VIII. LABORATORY CONTROL SAMPLES

Objective: Data for laboratory control samples are generated to provide information on the accuracy of the analytical method and on the laboratory performance.

Evaluation: Reported results were evaluated to determine compliance with the required acceptance criteria.

Laboratory control samples were analyzed at the appropriate frequency. All recoveries were within control limits.

Action: No qualifiers should be applied.

IX. REGIONAL QUALITY ASSURANCE AND QUALITY CONTROL

Not applicable to this SDG

X. INTERNAL STANDARDS

Objective: Internal standard performance criteria ensure that GC/MS sensitivity and response are stable during every analytical run sequence.

Evaluation: Reported results were evaluated to determine compliance with the required acceptance criteria.

All internal standard area counts and retention times were within the established control limits, with the exception of those shown in the following table.

Sample	Internal Standard	Area Counts	Control Limits	Action
U3SP-0404-02	Perylene-d12	34%	50-200%	J/UJ*
U3SP-0404-01	Perylene-d12	34%	50-200%	J/UJ*
U3SQ-0404-01	Perylene-d12	35%	50-200%	J/UJ*

* Associated compounds: di-n-octylphthalate, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, benzo(g,h,i)perylene, dibenzo(a,h)anthracene.

Action: Qualifiers should be applied to the associated compounds as indicated in the preceding table.

XI. TENTATIVELY IDENTIFIED COMPOUNDS

Objective: Chromatographic peaks in semivolatile fraction analyses that are not target analytes, surrogates, or internal standards are potential tentatively identified compounds (TICs). TICs must be qualitatively identified by a National Institute of Standards and Testing (NIST) mass spectral library search and the identifications assessed by the data reviewer.

Evaluation: TICs were not included with this SDG.

Action: None.

XII. COMPOUND QUANTITATION AND REPORTED CRQLS

Objective: Careful evaluation is required to ensure that the reported quantitation results and contract required quantitation limits (CRQLs) for target compounds are accurate.

Evaluation: Quantitation reports and sample preparation sheets were examined for all samples to verify the reported results and quantitation limits.

No errors or other discrepancies were found, with the exception of the analytes shown in the following table. These analytes were reported at detection limits above those specified in the QAPjP for the soil analysis.

Analyte	QAPjP Reporting Limit	Lab Reporting Limit
2-Nitrophenol	330 ug/Kg	1700 ug/Kg
Benzoic Acid	1000 ug/Kg	1700 ug/Kg
2,4,5-Trichlorophenol	330 ug/Kg	1700 ug/Kg
2-Nitroaniline	1000 ug/Kg	1700 ug/Kg
3-Nitroaniline	1000 ug/Kg	1700 ug/Kg
2,4-Dinitrophenol	1000 ug/Kg	1700 ug/Kg
4-Nitrophenol	1000 ug/Kg	1700 ug/Kg
4-Nitroaniline	660 ug/Kg	1700 ug/Kg
4,6-Dinitro-2-methylphenol	1000 ug/Kg	1700 ug/Kg

Analyte	QAP/P Reporting Limit	Lab Reporting Limit
Pentachlorophenol	1000 ug/Kg	1700 ug/Kg
3,3'-Dichlorobenzidine	660 ug/Kg	1700 ug/Kg

Action: No qualifiers should be applied, but the data user should be aware of the deviation from QAP/P requirements.

OVERALL DATA ASSESSMENT

Out of control events experienced by the laboratory have warranted the qualification of a minimal portion of the data set. The deficiencies described in this report are not considered cause for serious concern with regard to the laboratory's ability to identify and quantify the required target analytes. Based on the information evaluated, the overall quality of the data appears to be good.

**DATA VERIFICATION REPORT
VOLATILE AROMATIC ORGANIC COMPOUNDS**

Project Name: Tooele Army Depot
USACE Prime Contractor: Kleinfelder
Laboratory: Curtis & Tompkins, Ltd.
Sample Delivery Groups: 129063
Analysis: Volatile Aromatic Organic Compounds by Method SW8020
Review Guideline Source Document: *USEPA CLP National Functional Guidelines for Organic Data Review, 1994 Revision*
EPA QC Level: Level III

Field ID	Laboratory ID	Matrix	Analysis
U1SP-0421-02	129063-006	Soil	Volatile Aromatic Organic Compounds
U1SP-0422-02	129063-007	Soil	Volatile Aromatic Organic Compounds

INTRODUCTION

This verification report assesses the analytical data quality of the analyses listed on the preceding cover page. Samples were analyzed for volatile aromatic organic compounds in accordance with *USEPA Method SW8020*. The review criteria employed in the generation of this report is based on the QC requirements contained in the analytical method and the *Quality Assurance Project Plan (QAPjP)*, February 1997 revision; the review procedure is consistent with *USEPA CLP National Functional Guidelines for Organic Data Review*, 1994 Revision to the extent possible. In cases where two qualifiers are listed as an action, such as "J/UJ", the first qualifier applies to positive results, and the second to non-detect results. In areas where definitive guidance is not provided in either *Functional Guidelines* or the *QAPjP*, data has been evaluated in a conservative manner using professional judgment.

I. HOLDING TIMES

Objective: The validity of results is ascertained based on the holding time of the sample from time of collection to time of sample extraction and analysis.

Evaluation: Holding times were determined by comparing the sampling date on the chain of custody records with the dates of analysis found on the Form I summaries. Samples were received properly preserved and refrigerated. The chain of custody records were complete and in agreement with the laboratory sample lists. All technical holding times were met.

Action: No qualifiers should be applied.

II. INITIAL CALIBRATION

Objective: Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data. Initial calibration demonstrates that the instrument is capable of acceptable performance and of producing a linear calibration curve, and is used to establish retention time windows. The response factor used to quantify associated sample results is determined by the mean of the response factors of the initial calibration.

Evaluation: Reported results were evaluated to determine compliance with the required acceptance criteria.

Initial calibrations were performed in accordance with the method. All RSD values were within control limits.

Action: No qualifiers should be applied.

III. CONTINUING CALIBRATION

Objective: Calibration compliance requirements are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data at the beginning of the analytical sequence. Continuing calibration standards are analyzed regularly throughout and at the completion of the sequence. They are used to demonstrate the consistency of the instrument performance, to verify the validity of the initial calibration, and to monitor any retention time shifts which may occur throughout the sequence.

Evaluation: Reported results were evaluated to determine compliance with the required acceptance criteria.

Continuing calibrations were performed in accordance with the method. All %D values were within control limits.

Action: No qualifiers should be applied.

IV. BLANKS

Objective: The purpose of laboratory and field blanks is to determine the existence and magnitude of contamination problems resulting from laboratory and field activities. The criteria for evaluation of blanks apply to any blank associated with the samples (e.g., method blanks, instrument blanks, trip blanks, and equipment blanks). If problems exist with any blank, all associated data must be carefully evaluated to determine whether or not there is an inherent variability in the data, or if the problem is an isolated occurrence not affecting other data.

Evaluation: Reported results were evaluated to determine compliance with the required acceptance criteria.

Method and instrument blank analyses were performed appropriately for this data set. No target compounds were reported in the blanks.

Action: No qualifiers should be applied.

V. SURROGATE SPIKES

Objective: Method performance for individual samples is demonstrated through spiking activities. All samples are spiked with surrogate compounds prior to sample preparation. The sample itself may produce effects due to such factors as interferences and high concentrations of analytes.

Evaluation: Reported results were evaluated to determine compliance with the required acceptance criteria.

All surrogate recoveries were within control limits.

Action: No qualifiers should be applied.

VI. MATRIX SPIKES/MATRIX SPIKE DUPLICATES

Objective: Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information.

Evaluation: Reported results were evaluated to determine compliance with the required acceptance criteria.

Matrix spikes and matrix spike duplicates were not performed for this analysis.

Action: No qualifiers should be applied.

VII. LABORATORY CONTROL SAMPLES

Objective: Data for laboratory control samples are generated to provide information on the accuracy of the analytical method and on the laboratory performance.

Evaluation: Reported results were evaluated to determine compliance with the required acceptance criteria.

Laboratory control samples were analyzed at the appropriate frequency. All recoveries were within control limits.

Action: No qualifiers should be applied.

XIII. SYSTEM PERFORMANCE

Objective: During the period following the instrument performance QC checks (e.g., blanks, calibration), changes may occur in the system that degrade the quality of the data. While this degradation would not be directly shown by QC checks until the next required series of QC analyses, a review of the ongoing data acquisition can yield indicators of instrument performance.

Evaluation: No indicators of degradation of performance were observed throughout the analytical sequence.

Action: No qualifiers should be applied.

IX. COMPOUND QUANTITATION AND REPORTED CRQLS

Objective: Careful evaluation is required to ensure that the reported quantitation results and contract required quantitation limits (CRQLs) for target compounds are accurate.

Evaluation: Quantitation reports and sample preparation sheets were examined for all samples to verify the reported results and quantitation limits.

No errors or other discrepancies were found.

Action: No qualifiers should be applied.

OVERALL DATA ASSESSMENT

Out of control events experienced by the laboratory have not warranted the qualification of any results in this data set. The deficiencies described in this report are not considered cause for concern with regard to the laboratory's ability to identify and quantify the required target analytes. Based on the information evaluated, the overall quality of the data appears to be good.

DATA VERIFICATION REPORT **TOTAL EXTRACTABLE PETROLEUM HYDROCARBONS**

Project Name: Tooele Army Depot

USACE Prime Contractor: Kleinfelder

Laboratory: Curtis & Tompkins, Ltd.

Sample Delivery Groups: 128573, 128636, 128696, 128788, 128828, 128926, 129063, 129124, 129292, 129358, 129491, 129503

Analysis: Total Extractable Petroleum Hydrocarbons by Method SW8015 (modified)

Review Guideline Source Document: USEPA CLP National Functional Guidelines for Organic Data Review, 1994 Revision

EPA QC Level: Level III

Field ID	Laboratory ID	Matrix	Analysis
U4SP-0307-01	128573-001	Soil	Total Extractable Petroleum Hydrocarbons
U4SP-0307-02	128573-002	Soil	Total Extractable Petroleum Hydrocarbons
U4SP-0307-03	128573-003	Soil	Total Extractable Petroleum Hydrocarbons
U4SP-0307-04	128573-004	Soil	Total Extractable Petroleum Hydrocarbons
U4SP-0307-05	128573-005	Soil	Total Extractable Petroleum Hydrocarbons
U4SQ-0307-01	128573-006	Soil	Total Extractable Petroleum Hydrocarbons
U4WQ-0307-01	128573-007	Water	Total Extractable Petroleum Hydrocarbons
U4SP-0310-01	128573-008	Soil	Total Extractable Petroleum Hydrocarbons
U4SP-0312-01	128636-001	Soil	Total Extractable Petroleum Hydrocarbons
U4WQ-0313-01	128636-002	Water	Total Extractable Petroleum Hydrocarbons
U2SP-0318-01	128696-001	Soil	Total Extractable Petroleum Hydrocarbons
U2SP-0319-01	128696-002	Soil	Total Extractable Petroleum Hydrocarbons
U2SP-0319-02	128696-003	Soil	Total Extractable Petroleum Hydrocarbons
U2WQ-0319-01	128696-004	Water	Total Extractable Petroleum Hydrocarbons
ULSP-0322-01	128788-001	Soil	Total Extractable Petroleum Hydrocarbons
ULSP-0322-04	128788-002	Soil	Total Extractable Petroleum Hydrocarbons
ULSP-0323-01	128788-003	Soil	Total Extractable Petroleum Hydrocarbons
V1WQ-0322-01	128788-004	Water	Total Extractable Petroleum Hydrocarbons
ULSP-0325-03	128788-006	Soil	Total Extractable Petroleum Hydrocarbons
U4WP-0329-01	128828-001	Water	Total Extractable Petroleum Hydrocarbons
U3SP-0404-02	128926-001	Soil	Total Extractable Petroleum Hydrocarbons
U3SP-0405-02	128926-002	Soil	Total Extractable Petroleum Hydrocarbons
U3SP-0407-02	128926-003	Soil	Total Extractable Petroleum Hydrocarbons

Field ID	Laboratory ID	Matrix	Analysis
U3SP-0408-03	128926-004	Soil	Total Extractable Petroleum Hydrocarbons
U3WQ-0404-01	128926-006	Water	Total Extractable Petroleum Hydrocarbons
U3SP-0404-01	128926-007	Soil	Total Extractable Petroleum Hydrocarbons
U3SQ-0404-01	128926-008	Soil	Total Extractable Petroleum Hydrocarbons
U3SP-0415-01	129063-001	Soil	Total Extractable Petroleum Hydrocarbons
U3SP-0418-01	129063-003	Soil	Total Extractable Petroleum Hydrocarbons
U3SP-0418-02	129063-004	Soil	Total Extractable Petroleum Hydrocarbons
U3SP-0417-01	129063-005	Soil	Total Extractable Petroleum Hydrocarbons
U1SP-0421-02	129063-006	Soil	Total Extractable Petroleum Hydrocarbons
U1SP-0422-02	129063-007	Soil	Total Extractable Petroleum Hydrocarbons
U1SP-0428-01	129124-001	Soil	Total Extractable Petroleum Hydrocarbons
U3WP-0512-03	129292-003	Water	Total Extractable Petroleum Hydrocarbons
U1WP-0513-02	129292-006	Water	Total Extractable Petroleum Hydrocarbons
U2WP-0520-04	129358-005	Water	Total Extractable Petroleum Hydrocarbons
U4SP-0602-01	129491-002	Soil	Total Extractable Petroleum Hydrocarbons
U4SQ-0602-01	129491-003	Soil	Total Extractable Petroleum Hydrocarbons
U1AP-0603-03	129503-004	Water	Total Extractable Petroleum Hydrocarbons

INTRODUCTION

This verification report assesses the analytical data quality of the analyses listed on the preceding cover page. Samples were analyzed for total extractable petroleum hydrocarbons in accordance with *USEPA Method SW8015 (modified)*. The review criteria employed in the generation of this report is based on the QC requirements contained in the analytical method and the *Quality Assurance Project Plan (QAPjP)*, February 1997 revision; the review procedure is consistent with *USEPA CLP National Functional Guidelines for Organic Data Review*, 1994 Revision to the extent possible. In cases where two qualifiers are listed as an action, such as "J/UJ", the first qualifier applies to positive results, and the second to non-detect results. In areas where definitive guidance is not provided in either *Functional Guidelines* or the *QAPjP*, data has been evaluated in a conservative manner using professional judgment.

I. HOLDING TIMES

Objective: The validity of results is ascertained based on the holding time of the sample from time of collection to time of sample extraction and analysis.

Evaluation: Holding times were determined by comparing the sampling date on the chain of custody records with the dates of analysis found on the Form I summaries. Samples were received properly preserved and refrigerated. The chain of custody records were complete and in agreement with the laboratory sample lists. All technical holding times were met.

Action: No qualifiers should be applied.

II. INITIAL CALIBRATION

Objective: Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data. Initial calibration demonstrates that the instrument is capable of acceptable performance and of producing a linear calibration curve, and is used to establish retention time windows. The response factor used to quantify associated sample results is determined by the mean of the response factors of the initial calibration.

Evaluation: Reported results were evaluated to determine compliance with the required acceptance criteria.

Initial calibrations were performed in accordance with the method. All RSD values were within control limits.

Action: No qualifiers should be applied.

III. CONTINUING CALIBRATION

Objective: Calibration compliance requirements are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data at the beginning of the analytical sequence. Continuing calibration standards are analyzed regularly throughout and at the completion of the sequence. They are used to demonstrate the consistency of the instrument performance, to verify the validity of the initial calibration, and to monitor any retention time shifts which may occur throughout the sequence.

Evaluation: Reported results were evaluated to determine compliance with the required acceptance criteria.

Continuing calibrations were performed in accordance with the method. All %D values were within control limits.

Action: No qualifiers should be applied.

IV. BLANKS

Objective: The purpose of laboratory and field blanks is to determine the existence and magnitude of contamination problems resulting from laboratory and field activities. The criteria for evaluation of blanks apply to any blank associated with the samples (e.g., method blanks, instrument blanks, trip blanks, and equipment blanks). If problems exist with any blank, all associated data must be carefully evaluated to determine whether or not there is an inherent variability in the data, or if the problem is an isolated occurrence not affecting other data.

Evaluation: Reported results were evaluated to determine compliance with the required acceptance criteria.

Method and instrument blank analyses were performed appropriately for this SDG. No target compounds were reported in the blanks.

Action: No qualifiers should be applied.

V. SURROGATE SPIKES

Objective: Method performance for individual samples is demonstrated through spiking activities. All samples are spiked with surrogate compounds prior to sample preparation. The sample itself may produce effects due to such factors as interferences and high concentrations of analytes.

Evaluation: Reported results were evaluated to determine compliance with the required acceptance criteria.

All surrogate recoveries were within control limits.

Action: No qualifiers should be applied.

VI. MATRIX SPIKES/MATRIX SPIKE DUPLICATES

Objective: Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information.

Evaluation: Reported results were evaluated to determine compliance with the required acceptance criteria.

**DATA VERIFICATION REPORT
TOTAL VOLATILE PETROLEUM HYDROCARBONS**

Project Name: Tooele Army Depot

USACE Prime Contractor: Kleinfelder

Laboratory: Curtis & Tompkins, Ltd.

Sample Delivery Groups: 128573, 128636, 128696, 128788, 128828,
128926, 129063, 129124, 129292, 129358,
129491, 129503

Analysis: Total Volatile Petroleum Hydrocarbons by Method
SW8015 (modified)

Review Guideline Source Document: USEPA CLP National Functional Guidelines for
Organic Data Review, 1994 Revision

EPA QC Level: Level III

Field ID	Laboratory ID	Matrix	Analysis
U4SP-0307-01	128573-001	Soil	Total Volatile Petroleum Hydrocarbons
U4SP-0307-02	128573-002	Soil	Total Volatile Petroleum Hydrocarbons
U4SP-0307-03	128573-003	Soil	Total Volatile Petroleum Hydrocarbons
U4SP-0307-04	128573-004	Soil	Total Volatile Petroleum Hydrocarbons
U4SP-0307-05	128573-005	Soil	Total Volatile Petroleum Hydrocarbons
U4SQ-0307-01	128573-006	Soil	Total Volatile Petroleum Hydrocarbons
U4WQ-0307-01	128573-007	Water	Total Volatile Petroleum Hydrocarbons
U4SP-0310-01	128573-008	Soil	Total Volatile Petroleum Hydrocarbons
U4SP-0312-01	128636-001	Soil	Total Volatile Petroleum Hydrocarbons
U4WQ-0313-01	128636-002	Water	Total Volatile Petroleum Hydrocarbons
U2SP-0318-01	128696-001	Soil	Total Volatile Petroleum Hydrocarbons
U2SP-0319-01	128696-002	Soil	Total Volatile Petroleum Hydrocarbons
U2SP-0319-02	128696-003	Soil	Total Volatile Petroleum Hydrocarbons
U2WQ-0319-01	128696-004	Water	Total Volatile Petroleum Hydrocarbons
ULSP-0322-01	128788-001	Soil	Total Volatile Petroleum Hydrocarbons
ULSP-0322-04	128788-002	Soil	Total Volatile Petroleum Hydrocarbons
ULSP-0323-01	128788-003	Soil	Total Volatile Petroleum Hydrocarbons
V1WQ-0322-01	128788-004	Water	Total Volatile Petroleum Hydrocarbons
ULSP-0325-03	128788-006	Soil	Total Volatile Petroleum Hydrocarbons
U4WP-0329-01	128828-001	Water	Total Volatile Petroleum Hydrocarbons
U3SP-0404-02	128926-001	Soil	Total Volatile Petroleum Hydrocarbons
U3SP-0405-02	128926-002	Soil	Total Volatile Petroleum Hydrocarbons
U3SP-0407-02	128926-003	Soil	Total Volatile Petroleum Hydrocarbons

Field ID	Laboratory ID	Matrix	Analysis
U3SP-0408-03	128926-004	Soil	Total Volatile Petroleum Hydrocarbons
U3WQ-0404-01	128926-006	Water	Total Volatile Petroleum Hydrocarbons
U3SP-0404-01	128926-007	Soil	Total Volatile Petroleum Hydrocarbons
U3SQ-0404-01	128926-008	Soil	Total Volatile Petroleum Hydrocarbons
U3SP-0415-01	129063-001	Soil	Total Volatile Petroleum Hydrocarbons
U3SP-0418-01	129063-003	Soil	Total Volatile Petroleum Hydrocarbons
U3SP-0418-02	129063-004	Soil	Total Volatile Petroleum Hydrocarbons
U3SP-0417-01	129063-005	Soil	Total Volatile Petroleum Hydrocarbons
U1SP-0421-02	129063-006	Soil	Total Volatile Petroleum Hydrocarbons
U1SP-0422-02	129063-007	Soil	Total Volatile Petroleum Hydrocarbons
U1SP-0428-01	129124-001	Soil	Total Volatile Petroleum Hydrocarbons
U2WP-0520-02	129358-003	Water	Total Volatile Petroleum Hydrocarbons
U3WP-0520-02	129460-001	Water	Total Volatile Petroleum Hydrocarbons
U1WP-0513-01	129460-002	Water	Total Volatile Petroleum Hydrocarbons
U4WQ-0602-01	129491-001	Water	Total Volatile Petroleum Hydrocarbons
U4SP-0602-01	129491-002	Soil	Total Volatile Petroleum Hydrocarbons
U4SQ-0602-01	129491-003	Soil	Total Volatile Petroleum Hydrocarbons
U1AP-0603-02	129503-003	Water	Total Volatile Petroleum Hydrocarbons

III. CONTINUING CALIBRATION

Objective: Calibration compliance requirements are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data at the beginning of the analytical sequence. Continuing calibration standards are analyzed regularly throughout and at the completion of the sequence. They are used to demonstrate the consistency of the instrument performance, to verify the validity of the initial calibration, and to monitor any retention time shifts which may occur throughout the sequence.

Evaluation: Reported results were evaluated to determine compliance with the required acceptance criteria.

Continuing calibrations were performed in accordance with the method. All %D values were within control limits, with the exception of those shown in the following table.

Date	Compound	%D	Criteria	Action	Associated Samples
6/4/97	Gasoline	+30	<15%	J/None	U4SP-0602-01, U4SQ-0602-01

Action: Results for compounds demonstrating increased sensitivity from the initial calibration are considered estimated with a potential high bias. Qualifiers should be applied as indicated in the preceding table.

IV. BLANKS

Objective: The purpose of laboratory and field blanks is to determine the existence and magnitude of contamination problems resulting from laboratory and field activities. The criteria for evaluation of blanks apply to any blank associated with the samples (e.g., method blanks, instrument blanks, trip blanks, and equipment blanks). If problems exist with any blank, all associated data must be carefully evaluated to determine whether or not there is an inherent variability in the data, or if the problem is an isolated occurrence not affecting other data.

Evaluation: Reported results were evaluated to determine compliance with the required acceptance criteria.

Method and instrument blank analyses were performed appropriately for this data set. No target compounds were reported in the blanks.

Action: No qualifiers should be applied.

V. SURROGATE SPIKES

Objective: Method performance for individual samples is demonstrated through spiking activities. All samples are spiked with surrogate compounds prior to sample preparation. The sample itself may produce effects due to such factors as interferences and high concentrations of analytes.

Evaluation: Reported results were evaluated to determine compliance with the required acceptance criteria.

All surrogate recoveries were within control limits, with the exception of those shown in the following table.

Sample	Surrogate	%Rec	Control Limits	Action
ULSP-0322-04	Trifluorotoluene	266%	65-135%	J/None
	Bromobenzene	157%	65-135%	J/None
ULSP-0323-01	Trifluorotoluene	320%	65-135%	J/None
	Bromobenzene	164%	65-135%	J/None
U3SP-0415-01	Trifluorotoluene	53%	65-135%	J/UJ
U3SP-0418-01	Trifluorotoluene	52%	65-135%	J/UJ
U3SP-0418-02	Trifluorotoluene	52%	65-135%	J/UJ
U3SP-0417-01	Trifluorotoluene	53%	65-135%	J/UJ
U1SP-0421-02	Trifluorotoluene	52%	65-135%	J/UJ
U1SP-0422-02	Trifluorotoluene	52%	65-135%	J/UJ
U3SP-0405-02	Trifluorotoluene	60%	65-135%	J/UJ
U3SP-0407-02	Trifluorotoluene	55%	65-135%	J/UJ
U3SP-0408-03	Trifluorotoluene	55%	65-135%	J/UJ
U3SQ-0404-01	Trifluorotoluene	63%	65-135%	J/UJ

Action: Qualifiers should be applied as indicated in the preceding table.

VI. MATRIX SPIKES/MATRIX SPIKE DUPLICATES

Objective: Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information.

Evaluation: Reported results were evaluated to determine compliance with the required acceptance criteria.

Matrix spikes and matrix spike duplicates were analyzed at the appropriate frequency. All recoveries and RPD values were within control limits.

Action: No qualifiers should be applied.

VII. LABORATORY CONTROL SAMPLES

Objective: Data for laboratory control samples are generated to provide information on the accuracy of the analytical method and on the laboratory performance.

Evaluation: Reported results were evaluated to determine compliance with the required acceptance criteria.

Laboratory control samples were analyzed at the appropriate frequency. All recoveries were within control limits.

Action: No qualifiers should be applied.

VIII. COMPOUND QUANTITATION AND REPORTED CRQLs

Objective: Careful evaluation is required to ensure that the reported quantitation results and contract required quantitation limits (CRQLs) for target compounds are accurate.

Evaluation: Quantitation reports and sample preparation sheets were examined for all samples to verify the reported results and quantitation limits.

No errors or other discrepancies were found.

Action: No qualifiers should be applied.

OVERALL DATA ASSESSMENT

Out of control events experienced by the laboratory have warranted the qualification of a minimal portion of the data set. The deficiencies described in this report are not considered cause for serious concern with regard to the laboratory's ability to identify and quantify the required target analytes. Based on the information evaluated, the overall quality of the data appears to be good.

**DATA VERIFICATION REPORT
METALS**

Project Name: Tooele Army Depot
USACE Prime Contractor: Kleinfelder
Project Number: 23-900026-A02
Laboratory: Curtis & Tompkins, Ltd..
Sample Delivery Groups: 128926, 129265, 129292
Analysis: Metals by Method SW6010A
Mercury by Method SW7471
Review Guideline Source Document: *USEPA CLP National Functional Guidelines for Inorganic Data Review, 1994 Revision*
EPA QC Level: Level III

Field ID	Laboratory ID	Matrix	Analysis
U3SP-0404-02	128926-001	Soil	Metals
U2SP-0507-01	129265-002	Soil	Metals
U2SP-0507-03	129265-004	Soil	Metals
U3WP-0512-04	129292-004	Water	Metals

INTRODUCTION

This verification report assesses the analytical data quality of the samples listed in the preceding table. Samples were analyzed for total and dissolved target metals in accordance with *USEPA Methods SW6010A* and *SW7471*. The review criteria employed in the generation of this report is based on the QC requirements contained in the analytical method and the *Quality Assurance Project Plan (QAPjP)*, February 1997 revision; the review procedure is consistent with *USEPA CLP National Functional Guidelines for Inorganic Data Review*, 1994 Revision to the extent possible. In cases where two qualifiers are listed as an action, such as "J/UJ", the first qualifier applies to positive results, and the second to non-detect results. In areas where definitive guidance is not provided in either *Functional Guidelines* or the *QAPjP*, data has been evaluated in a conservative manner using professional judgment.

I. HOLDING TIMES

Objective: The validity of results is ascertained based on the holding time of the sample from time of collection to time of sample analysis.

Evaluation: Holding times were determined by comparing the sampling date on the chain of custody records with the dates of analysis found in the summary forms. The chain of custody records were complete and in agreement with the laboratory sample lists. Technical holding times were met for all ICP and GFAA analyses.

Action: No qualifiers should be applied.

II. CALIBRATION

Objective: Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable quantitative data. Initial calibration demonstrates that the instrument is capable of acceptable performance at the beginning of the analytical sequence, and continuing calibration verification confirms that the initial calibration is valid throughout the analytical run sequence.

Evaluation: Reported results were evaluated to determine compliance with the required acceptance criteria.

Initial and continuing calibration verification standards were analyzed at the proper frequency in all analytical run sequences, and recoveries were within the required limits. Correlation coefficients for multipoint calibration curves were greater than 0.995 in all cases.

Action: No qualifiers should be applied.

III. BLANKS

Objective: The purpose of laboratory and field blanks is to determine the existence and magnitude of contamination resulting from laboratory and field activities. The criteria for evaluation of blanks applies to any blank associated with the samples including method blanks, instrument blanks, and equipment blanks. If problems exist with any blank, careful evaluation is required to determine the potential impact on all associated data.

Evaluation: Reported results were evaluated to determine compliance with the required acceptance criteria.

Method and instrument blank analyses were performed appropriately for this SDG. Summary forms were reviewed for all blanks. Several analytes were detected in the blanks at concentrations in excess of the instrument detection limit (IDL). The highest concentrations of contaminants found in the blanks are listed in the following table.

Blank	Analyte	Blank Value	Action Limit	Action	Associated Samples
CCB2 5/27	Potassium	-842 ug/L	4210 ug/L	J/UJ	U3WP-0512-04
CCB1 5/21	Arsenic	-7.1 ug/L	36 ug/L	J/UJ	U2SP-0507-01, U2SP-0507-03

Action: Sample results greater than the action limit (5 times the amount found in any associated blank) are not considered affected by blank contamination and have not been qualified. Any sample result at a concentration less than the action limit should be qualified as shown above.

IV. ICP INTERFERENCE CHECK SAMPLE

Objective: The ICP interference check sample (ICS) verifies that interelement and background corrections are functioning properly.

Evaluation: Reported results were evaluated to determine compliance with the required acceptance criteria.

All ICS recoveries were within established criteria.

Action: No qualifiers should be applied.

V. LABORATORY CONTROL SAMPLES (LCS)

Objective: The laboratory control sample measures the overall performance of the analytical process, including sample preparation.

Evaluation: Reported results were evaluated to determine compliance with the required acceptance criteria.

Laboratory control samples were analyzed at the appropriate frequency. All recoveries were within control limits.

Action: No qualifiers should be applied.

VI. DUPLICATE SAMPLE ANALYSIS

Objective: Duplicate analyses are performed in order to assess laboratory precision for each sample matrix.

Evaluation: Reported results were evaluated to determine compliance with the required acceptance criteria.

Laboratory duplicates were analyzed at the appropriate frequency. All recoveries were within control limits.

Action: No qualifiers should be applied.

VII. MATRIX SPIKE SAMPLE ANALYSIS

Objective: Matrix spike sample analyses are performed in order to assess method performance for each sample matrix.

Evaluation: Reported results were evaluated to determine compliance with the required acceptance criteria.

Matrix spikes were analyzed at the appropriate frequency. All recoveries were within control limits.

Action: No qualifiers should be applied.

VIII. GRAPHITE FURNACE ATOMIC ABSORPTION QC

Objective: Duplicate injections and furnace post digestion spikes establish the precision and accuracy of the individual analytical determinations.

Evaluation: Reported results were evaluated to determine compliance with the required acceptance criteria.

All post spike analyses were within control limits.

Action: No qualifiers should be applied.

IX. ICP SERIAL DILUTION

Objective: The serial dilution determines whether significant physical or chemical interferences exist due to sample matrix.

Evaluation: Serial dilutions were not performed.

Action: No qualifiers should be applied.

X. SAMPLE RESULT VERIFICATION

Objective: Careful evaluation is required to ensure that the reported results and contract required detection limits (CRDLs) for target analytes are accurate.

Evaluation: Reported results were evaluated to determine compliance with the required acceptance criteria.

All reported results were within the appropriate calibration ranges. No errors or other discrepancies were found.

Action: No qualifiers should be applied.

XI. FIELD DUPLICATES

No field duplicates were identified in this SDG.

XII. FIELD BLANKS

No field blanks were identified in this SDG.

OVERALL DATA ASSESSMENT

Out of control events experienced by the laboratory have warranted the qualification of a minimal portion of the data set. The deficiencies described in this report are not considered cause for serious concern with regard to the laboratory's ability to identify and quantify the required target analytes. Based on the information evaluated, the overall quality of the data appears to be good.

**DATA VERIFICATION REPORT
WET CHEMISTRY**

Project Name: Tooele Army Depot

USACE Prime Contractor: Kleinfelder

Project Number: 23-900026-A02

Laboratory: Curtis & Tompkins, Ltd.
APPL, Inc.
Clayton Environmental Consultants

Sample Delivery Groups: 128573, 128926, 129292

Analyses: pH by Method 9045C
TKN by Method E351.4
Total Phosphorous by Method E365.2
Nitrate-N by Method E353.2
Common Anions by Method E300.0
Alkalinity by Method E310.1

Review Guideline Source Document: *USEPA CLP National Functional Guidelines for Inorganic Data Review, 1994 Revision*

EPA QC Level: Level III

Field ID	Laboratory ID	Matrix	Analysis
U4SP-0307-01	128573-001	Soil	pH, TKN, Total Phosphorous, Nitrate-N
U3SP-0404-02	128926-001	Soil	pH, TKN, Total Phosphorous, Nitrate-N
U3WP-0512-04	129292-004	Water	Common Anions, Alkalinity

INTRODUCTION

This verification report assesses the analytical data quality of the samples listed in the preceding table. Samples were analyzed for pH, TKN, total phosphorous, nitrate-N, common anions and alkalinity in accordance with *USEPA Methods SW9045C, E351.4, E365.2, E353.3, E300.0 and E310.1*, respectively. The review criteria employed in the generation of this report is based on the QC requirements contained in the analytical method and the *Quality Assurance Project Plan (QAPjP)*, February 1997 revision; the review procedure is consistent with *USEPA CLP National Functional Guidelines for Inorganic Data Review*, 1994 Revision to the extent possible. In cases where two qualifiers are listed as an action, such as "J/UJ", the first qualifier applies to positive results, and the second to non-detect results. In areas where definitive guidance is not provided in either *Functional Guidelines* or the *QAPjP*, data has been evaluated in a conservative manner using professional judgment.

I. HOLDING TIMES

Objective: The validity of results is ascertained based on the holding time of the sample from time of collection to time of sample analysis.

Evaluation: Holding times were determined by comparing the sampling date on the chain of custody records with the dates of analysis found on the Form I summaries. Samples were received properly preserved and refrigerated. The chain of custody records were complete and in agreement with the laboratory sample lists. Technical holding times were met with the exception of those shown in the following table.

Analysis	Sample ID	Criteria	Time to Analysis	Action
Nitrate-N	U4SP-0307-01	48 hours	16 days	R/R
Nitrate-N	U3SP-0404-02	48 hours	11 days	R/R
Alkalinity	U3WP-0512-04	48 hours	9 days	R/R

Action: Qualifiers should be applied as indicated in the preceding table.

Note: Although the holding times for nitrate listed in Table 4-1A of the *QAPjP* are 48 hours to extraction and 48 hours to analysis, Table I-1 of the *USACE EM 200-1-3* specifies a soil holding time of 48 hours from sample collection to analysis.

II. CALIBRATION

Objective: Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable quantitative data. Initial calibration demonstrates that the instrument is capable of acceptable performance at the beginning of the analytical sequence, and continuing calibration verification confirms that the initial calibration is valid throughout the analytical run sequence.

Evaluation: Reported results were evaluated to determine compliance with the required acceptance criteria.

Initial and continuing calibration verification standards were analyzed at the proper frequency in all analytical run sequences, and recoveries were within the required limits. Correlation coefficients for multipoint calibration curves were greater than 0.995 in all cases.

Action: No qualifiers should be applied.

III. BLANKS

Objective: The purpose of laboratory and field blanks is to determine the existence and magnitude of contamination resulting from laboratory and field activities. The criteria for evaluation of blanks applies to any blank associated with the samples including method blanks, instrument blanks, and equipment blanks. If problems exist with any blank, careful evaluation is required to determine the potential impact on all associated data.

Evaluation: Reported results were evaluated to determine compliance with the required acceptance criteria.

Method and instrument blank analyses were performed appropriately for this SDG. Summary forms were reviewed for all blanks. No target analytes were reported in the blanks.

Action: No qualifiers should be applied.

IV. LABORATORY CONTROL SAMPLES (LCS)

Objective: The laboratory control sample measures the overall performance of the analytical process, including sample preparation.

Evaluation: Reported results were evaluated to determine compliance with the required acceptance criteria.

Laboratory control samples were analyzed at the appropriate frequency. All recoveries were within control limits.

Action: No qualifiers should be applied.

V. DUPLICATE SAMPLE ANALYSIS

Objective: Duplicate analyses are performed in order to assess laboratory precision for each sample matrix.

Evaluation: Reported results were evaluated to determine compliance with the required acceptance criteria.

Laboratory duplicates were analyzed at the appropriate frequency. All recoveries were within control limits.

Action: No qualifiers should be applied.

VI. MATRIX SPIKE SAMPLE ANALYSIS

Objective: Matrix spike sample analyses are performed in order to assess method performance for each sample matrix.

Evaluation: Reported results were evaluated to determine compliance with the required acceptance criteria.

Matrix spikes were analyzed at the appropriate frequency. All recoveries were within control limits.

Action: No qualifiers should be applied.

VII. SAMPLE RESULT VERIFICATION

Objective: Careful evaluation is required to ensure that reported results and contract required detection limits (CRDLs) for target analytes are accurate.

Evaluation: Reported results were evaluated to determine compliance with the required acceptance criteria.

All reported results were within the appropriate calibration ranges. No errors or other discrepancies were found.

Action: No qualifiers should be applied.

VIII. FIELD DUPLICATES

No field duplicates were identified in this SDG.

IX. FIELD BLANKS

No field blanks were identified in this SDG.

OVERALL DATA ASSESSMENT

Extreme holding time exceedances have warranted the rejection of all nitrate-N results. With this exception, the deficiencies described in this report are not considered cause for serious concern with regard to the laboratory's ability to identify and quantify the required target analytes. Based on the information evaluated, the overall quality of the data appears to be fair.

TECHNICAL MEMORANDUM
Bench Test Final Report
TEAD Building 637N
December 23, 1997

INTRODUCTION

Bench testing to evaluate hydrocarbon contamination degradation potential at Building 637N began in June 1997. This work was conducted under delivery order 23 of DACW05-95-D-0022 and in accordance with the March 3, 1997 Bench Test Workplan. This technical memorandum describes bench testing methodology and objectives, presents the six month program's sampling and monitoring results, and provides a final analysis of data collected.

BACKGROUND AND OBJECTIVE

An uncharacteristic mixture of hydrocarbon contaminants, primarily non-volatile waste oils in the C_{18} - C_{35} range, were discovered in subsurface soils at Building 637N. While the contaminant has been determined to be potentially biodegradable, an incomplete knowledge of its specific chemical composition necessitated bench scale testing prior to site-wide corrective recommendations.

The bench scale test was conducted to provide a preliminary evaluation of the compound's degradation potential in a controlled laboratory environment. The test was designed to evaluate whether naturally occurring nutrient levels are adequate to sustain C_{18} - C_{35} degradation, whether indigenous bacteria can digest these heavier hydrocarbons, and if a surfactant might facilitate digestion.

Test results were expected to indicate whether the contaminant is reasonably degradable and suggest design conditions for a follow-up pilot scale test or a full-scale corrective action, as appropriate.

BENCH TESTING METHODOLOGY AND ACTIVITIES

Generally, the bench test was designed to compare contaminant degradation in three samples of contaminated soil from the site. One sample received a nutrient mixture, one received a surfactant, and one received no additives. Bench test methodologies and set-up procedures were presented in previous reports. The following discussion describes activities completed during the sixth month of degradation testing.

Activities During Month 6

The first three primary procedures described below were performed during month 6 as part of the ongoing bench scale testing strategy. Because visible fungal growth developed in the trays in month 2, procedure #4 was added during month 4 and repeated this month to potentially obtain additional information.

1. Each bench tray remained sealed and undisturbed for the first week of the sampling month. After the sealed period, the trays were tested for oxygen, carbon dioxide, and methane via the sample port to monitor specimen respiration over the test period.
2. Following the respiration period, the trays were ventilated periodically with a small air pump through ports mounted at the top of the trays, drawing air through the perforated bottom of the tray.
3. Following the ventilation period, a composite soil sample was taken from each tray and analyzed for:
 - Specific hydrocarbons using EPA Method 8015M for:
 1. diesel range, $C_{12}-C_{22}$
 2. motor oil range, $C_{22}-C_{50}$
 - Waste oil and diesel degrading bacteria counts
4. Small soil samples were collected from each bench tray to check for fungal growth. Samples from visibly low, medium, and high moisture content areas (~300 mg each) were collected from each tray and examined under 40x magnification. The presence and magnitude of visible fungal growth were recorded. The objective of the program was to investigate whether there were visible patterns in the bench soil that might suggest conditions for optimal microbe growth.

Chemical analyses were sent under chain of custody to Curtis and Tompkins Laboratories. Bacterial counts were completed by CET Environmental Services. An undisturbed soil specimen intended for sampling at the conclusion of testing was set aside, but was misplaced and could not be sampled as planned.

Sampling and Testing to Date

The bench test has undergone its sixth and final month of testing. The following activities, presented in Table 1, have been completed to date:

Table 1
Dates of Bench Test Activities

Activity - Event	Date
Sealed Week (month 6 begins)	September 15 – October 22
O ₂ , CO ₂ , Methane sampling	October 22
Sampling of Each Bench Test (Hydrocarbons, Bacteria)	September 14

At the end of the sixth month, each tray was sampled for diesel, motor oil, and hydrocarbon-degrading bacteria counts.

No difficulties were encountered during the scheduled activities.

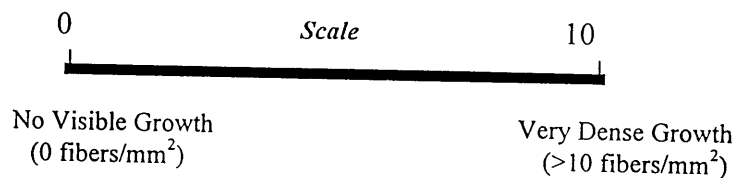
RESULTS AND ANALYSIS

Bench test sampling results to date are shown in Table 2, attached. The laboratory results for month 6 are attached as an appendix. Results distribution is consistent with previous samples, indicating that the distribution remains reasonably homogeneous.

Procedure #4 above provided some additional information regarding the relationship between moisture content and microbial growth. Table 3 indicates microbial growth visible at 40x magnification in each tray by moisture content.

Table 3
Visible Microbe Growth in Varied Soil Conditions

Soil Condition	Tray #1	Tray #2	Tray #3
Low Moisture Content (~ 2% by weight)	3	5	0
Medium Moisture Content (~ 10% by weight)	5	10	0
High Moisture Content (> 20% by weight)	1	3	0



In addition to the above-described sampling, each tray was monitored for oxygen, carbon dioxide, and methane with an infrared analyzer following the one week sealed period. The results are presented in Table 4.

Table 4
Bench Tray Gas Analysis Results

Bench Tray	Oxygen (% by vol.)	Carbon Dioxide (% by vol.)	Methane (% by vol.)
Tray #1	19.3	0.1	0.0
Tray #2	19.1	0.2	0.0
Tray #3	19.9	0.1	0.0

Cumulative diesel sampling results were fitted to a least squares curve fit to evaluate the extent to which contamination degraded with time. Motor oil range hydrocarbons did not indicate a verifiable reduction, so a fit analysis was not completed on this distribution. Analysis results are

presented in Table 5, and indicate an approximate reduction in diesel of about 400 mg/kg per month in Trays 1 and 2 and an increase of 350 mg/kg per month in Tray 3. It is likely that the surfactant added to Tray 3 broke down some of the motor oil range hydrocarbons to smaller chains that were subsequently detected as diesel range hydrocarbons.

Cumulative microbe sampling results indicate that populations of diesel-degrading bacteria increased by roughly two orders of magnitude above baseline rates by the second month of testing and were sustained through the test duration.

The Tray 3 diesel range increase suggests that the surfactant may have broken down some of the heavier hydrocarbons, but its presence appears to have impeded microbe growth relative to Trays 1 and 2. Therefore, bench testing did not indicate a surfactant benefit in contaminant degradation.

Based on cumulative nutrient data, indigenous nutrients do not appear to limit subsurface degradation. This is supported by the similar degradation rates observed in Tray 1 relative to the nutrient-enriched Tray 2, as shown in Table 5.

CONCLUSION AND RECOMMENDATIONS

Cumulative data from bench testing does not indicate that the heavy motor oil present in site shallow soils would be reasonably degradable with in-situ bioventing. Consistent with the respiration test at 637N and similar bioventing sites at TEAD, the diesel range hydrocarbons did indicate a measurable reduction and would be expected to degrade with bioventing. Nutrients did not appear to be a limiting factor in contaminant degradation.

It is recommended that bioventing be implemented to degrade the diesel and gasoline range hydrocarbons detected to 220 feet below the ground surface at 637N. It is not recommended that bioventing be relied upon to degrade the shallow motor oil contamination. This component of contamination at the site will likely require an ex-situ treatment strategy.

TABLE 2
CUMULATIVE BENCH TEST SAMPLING RESULTS
TEAD BUILDING 637N

Sample Location	Sample Date	Contaminants (mg/kg)		Bacteria Count ¹ Motor Oil Degrders	Nutrients (mg/kg)					Moisture (%)
		Diesel	Motor Oil		PO ₄	Fe	N	P	NH ₃ -N	
Baseline										
Undiv. sample	4/14/97			2.6	21.2					
Tray No. 1	4/14/97	5,700	17,000			3600	ND@110	ND@1.1	8	9
Tray No. 1 Dup	4/14/97	4,200	13,000						1.8	
Tray No. 2	4/14/97	4,500	11,000			4700	ND@110	ND@1.1	ND@0.5	9
Tray No. 3	4/14/97	5,000	15,000			4600	210	1.9	0.7	11
Average		5,067	14,333			4360	106.7	0.97	0.92	9.3
Month 1										
Tray No. 1	5/13/97	3,800	14,000	0.1						2
Tray No. 2	5/13/97	4,700	20,000	0.8						3
Tray No. 3	5/13/97	3,700	17,000	2.6						1
Average		4,067	17,000	1.2						2
Month 2										
Tray No. 1	6/10/97	7,300	17,000	135						8
Tray No. 2	6/10/97	5,800	15,000	270						3
Tray No. 3	6/10/97	5,000	10,000	36						4
Average		6,033	14,000	147.0						5

TABLE 2 (CONT.)
BENCH TEST SAMPLING RESULTS TO DATE
TEAD BUILDING 637N

[illegible]¹ Units of Colony Forming Units/g x 10⁵

KLEINFELDER

131060

PROJECT NO.		PROJECT NAME		ANALYSIS		RECEIVING LAB:	
23-900022-22		TEAR Bench Test		23-900022-22		Cust. & Tenors	
L.P. NO.		SAMPLES: (Signature/Number)		L.P. NO.		INSTRUCTIONS/REMARKS	
5AC5374		Received - 2677		5AC5374		Normal FAT	
DATE	SAMPLE I.D.	SAMPLE I.D.	MATRIX	NO. OF CON-TAINERS	TYPE OF CON-TAINERS		
MM/DD/YY	HH-MM-SS						
10/14/97	4:30:20	99139	S	1	P	Send Invoices	
10/14/97	4:33:20	99140	S	1	P	Attn: Carol Spahr	
10/14/97	11:32:20	99141	S	1	P	Ref. P.O. # on Invoice	
10/14/97	4:40:20	99142	S	1	P		
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Refiniquished by: (Signature)		Date/Time	Received by: (Signature)
<i>[Signature]</i>	10/14/97	5:30:20	<i>[Signature]</i>
Refiniquished by: (Signature)		Date/Time	Received by: (Signature)
Refiniquished by: (Signature)		Date/Time	Received for Laboratory by: (Signature)
			<i>[Signature]</i>

White - Sampler

Instructions/Remarks:		Send Results To:	
Normal FAT		KLEINFELDER	
For initial results to		3077 FITE CIRCLE	
Don't forget to		SACRAMENTO, CA 95827	
9/14/97		(916) 366-1701	
		Attn:	

CHAIN OF CUSTODY

White - Sampler

M-60

131060

PROJECT NO.		PROJECT NAME		RECEIVING LAB.		INSTRUCTIONS/REMARKS	
LP NO. (P.O. NO.)		SAMPLES: (Signature/Number)		ANALYSIS			
DATE	SAMPLE I.D. TIME HH-MM-SS	SAMPLE I.D.	MATRIX	NO. OF CON-TAINERS	TYPE OF CON-TAINERS		
10/14/97	4:22:30	991302	S	1	P	X	
10/14/97	4:23:30	991411	S	1	P	X	
10/14/97	4:34:30	991413	S	1	P	X	
10/14/97	4:46:30		S	1	P	X	
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Date/Time: 10/16 5:30

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Date/Time: *[Signature]*

Received by: (Signature) *[Signature]*

Received by: (Signature) *[Signature]*

Received for Laboratory by: (Signature) *[Signature]*

10/25/97

10/30/97

10/30/97

Send Results To: KLEINFELDER
3077 FITE CIRCLE
SACRAMENTO, CA 95827
(916) 366-1701

Attn:



CET ENVIRONMENTAL LABORATORY SERVICES

LABORATORY REPORT

KLEINFELDER

ATTN: Dave Jenkins
3077 Fite Circle
Sacramento, CA 95827

Client Project ID: 23-900023-A08
CET Project No: 2343-102

Sample Description: Soil
Number of Samples: 3

Sampled: 10/14/97
Received: 10/20/97
Analyzed: 10/22/97
Reported: 10/29/97

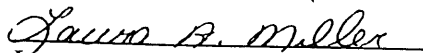
Analysis Method: Motor Oil Degradar plate count.


LABORATORY RESULTS (Colony Forming Units/grams)

<u>Sample ID</u>	<u>Motor Oil Degradars</u> (MSM)
99138	44.5 x 10 ⁵
99141	580 x 10 ⁵
99143	72.0 x 10 ⁵

MSM - Minimal Salts Media supplemented with 2,500 ppm motor oil (selective medium, only supports growth of those bacteria capable of using motor oil as a sole source of carbon and energy).

CET ENVIRONMENTAL SERVICES, INC.


Laura A. Miller
Laboratory Technician


Lori E. Headrick
Manager Technical Services

14761 Bentley Circle, Tustin, California (714)505-1800 FAX (714)505-0987

H:\USER\LAURA\KLEINFEL\2343-34.WPD



CET ENVIRONMENTAL LABORATORY SERVICES

LABORATORY REPORT

KLEINFELDER

ATTN: Dave Jenkins
3077 Fite Circle
Sacramento, CA 95827

Client Project ID: 23-900023-A08
CET Project No: 2343-102

Sample Description: Soil
Number of Samples: 3

Sampled: 10/14/97
Received: 10/20/97
Analyzed: 10/22/97
Reported: 10/27/97

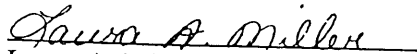
Analysis Method: Nutrient analysis (Hach ® Colorimetric Method).

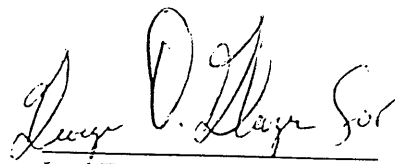
LABORATORY RESULTS (mg/kg)

<u>Sample ID</u>	<u>NH₃-N</u>	<u>NO₃-N</u>	<u>PO₄</u>
99138	11	9	11.7
99141	16	9	75.8
99143	118	10	32.5
Detection Limit (mg/kg)	0.50	0.50	0.50

mg/kg - milligrams per kilogram.
NH₃-N - Ammonia as Nitrogen
NO₃-N - Nitrate as Nitrogen
PO₄ - Phosphate

CET ENVIRONMENTAL SERVICES, INC.


Laura A. Miller
Laboratory Technician


Lori E. Headrick
Manager Technical Services

14761 Bentley Circle, Tustin, California (714) 505-1800 FAX (714) 505-0987



TEH-Tot Ext Hydrocarbons

Client: Kleinfelder
Project#: 23-900023-A08
Location: Tooele Bench Test

Analysis Method: EPA 8015M
Prep Method: CA LUFT

Sample #	Client ID	Batch #	Sampled	Extracted	Analyzed	Moisture
131060-001	99139	37102	10/14/97	10/24/97	10/29/97	8%
131060-002	99140	37102	10/14/97	10/24/97	10/29/97	5%
131060-003	99142	37102	10/14/97	10/24/97	10/29/97	4%

Matrix: Soil

Analyte	Units	131060-001	131060-002	131060-003
Diln Fac:		40	40	40
Diesel C12-C22	mg/Kg	2100 YH	2000 YH	5500 YH
Motor Oil C22-C50	mg/Kg	12000	12000	16000
Surrogate				
Hexacosane	%REC	DO	DO	DO

DO: Surrogate diluted out

Y: Sample exhibits fuel pattern which does not resemble standard

H: Heavier hydrocarbons than indicated standard

Lab#: 131060



Curtis & Tompkins, Ltd.

Phosphate, Total

Client: Kleinfelder
Project #: 23-900023-A08
Location : Tooele Bench Test

Analysis Method: EPA 365.2
Prep Method: EPA 365.2

Sample #	Client ID	Batch#	Sampled	Analyzed	Moisture
131060-001	99139	37255	14-OCT-97	31-OCT-97	8
131060-002	99140	37255	14-OCT-97	31-OCT-97	5
131060-003	99142	37255	14-OCT-97	31-OCT-97	4
QC57772	Method Blank	37255	-	31-OCT-97	-

Analyte: Phosphate, total (as P)

Matrix: Soil

Units: mg/Kg

Sample #	Client ID	Result	Reporting Limit	Dilution Factor
131060-001	99139	ND	0.33	1
131060-002	99140	ND	0.32	1
131060-003	99142	ND	0.31	1
QC57772		ND	0.30	1

ND = None Detected at or above Reporting Limit

Lab#: 131060



Curtis & Tompkins Ltd.

Nitrogen, Nitrate

Client: Kleinfelder
Project #: 23-900023-A08
Location : Tooele Bench Test

Analysis Method: EPA 353.2
Prep Method: EPA 353.2

Sample #	Client ID	Batch#	Sampled	Analyzed	Moisture
131060-001	99139	37046	14-OCT-97	22-OCT-97	8
131060-002	99140	37046	14-OCT-97	22-OCT-97	5
131060-003	99142	37046	14-OCT-97	22-OCT-97	4
QC57026	Method Blank	37046	-	22-OCT-97	-

Analyte: Nitrogen, Nitrate

Matrix: Soil

Units: mg/Kg

Sample #	Client ID	Result	Reporting Limit	Dilution Factor
131060-001	99139	2.4	2.2	1
131060-002	99140	2.4	2.1	1
131060-003	99142	2.2	2.1	1
QC57026		ND	2.0	1

ND = None Detected at or above Reporting Limit

CLIENT: Kleinfelder
 PROJECT ID: 23-900023-A08
 LOCATION: Tooele Bench Test
 MATRIX: Soil

DATE REPORTED: 10/30/97

Metals Analytical Report

		Iron				
Sample ID	Lab ID	Sample Date	Receive Date	Result* (mg/Kg)	Reporting Limit* (mg/Kg)	IDF QC Batch Method Analysis Date
99139	131060-001	10/14/97	10/20/97	3400	5.3	1 37081 EPA 6010A 10/24/97
99140	131060-002	10/14/97	10/20/97	3900	5.1	1 37081 EPA 6010A 10/24/97
99142	131060-003	10/14/97	10/20/97	4100	5.1	1 37081 EPA 6010A 10/24/97
* = Dry weight basis						

GC15 Channel B TEH

Sample Name : 131060-001,37102

FileName : G:\GC15\CHB\300B069.RAW

Method : B286TEH.MTH

Start Time : 0.01 min

Scale Factor: 0.0

End Time : 31.91 min

Plot Offset: 14 mV

Sample #: 37102

Date : 10/30/97 09:59 AM

Time of Injection: 10/29/97 12:26 PM

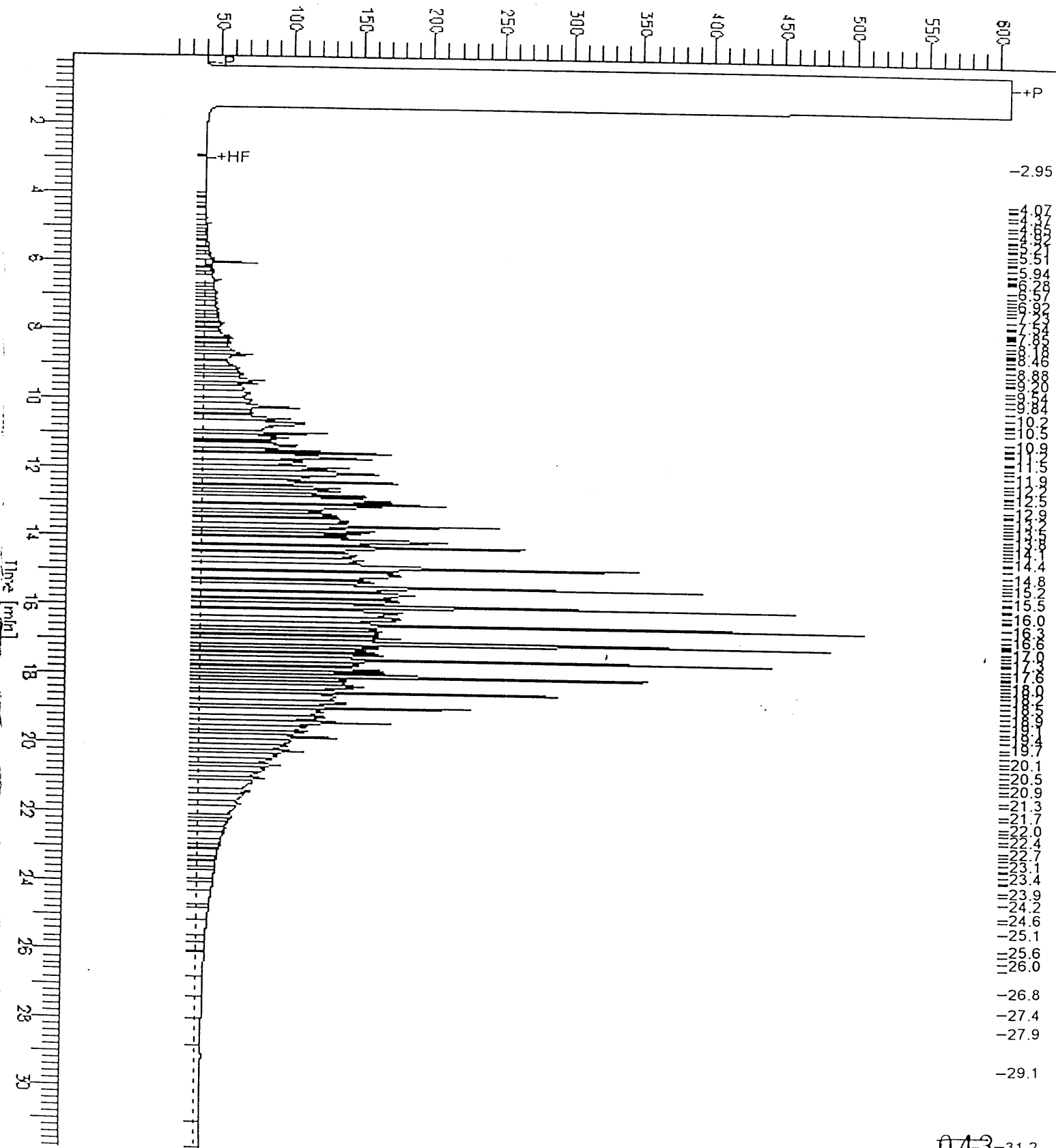
Low Point : 13.51 mV

Plot Scale: 593.7 mV

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High Point : 607.23 mV

Response [mV]



043-31.2

017

GC15 Channel B TEH

Sample Name : 131060-002, 37102

FileName : G:\GC15\CHB\300B070.RAW

Method : B286TEH.MTH

Start Time : 0.01 min

Scale Factor: 0.0

End Time : 31.91 min

Plot Offset: 6 mV

Sample #: 37102

Date : 10/30/97 10:00 AM

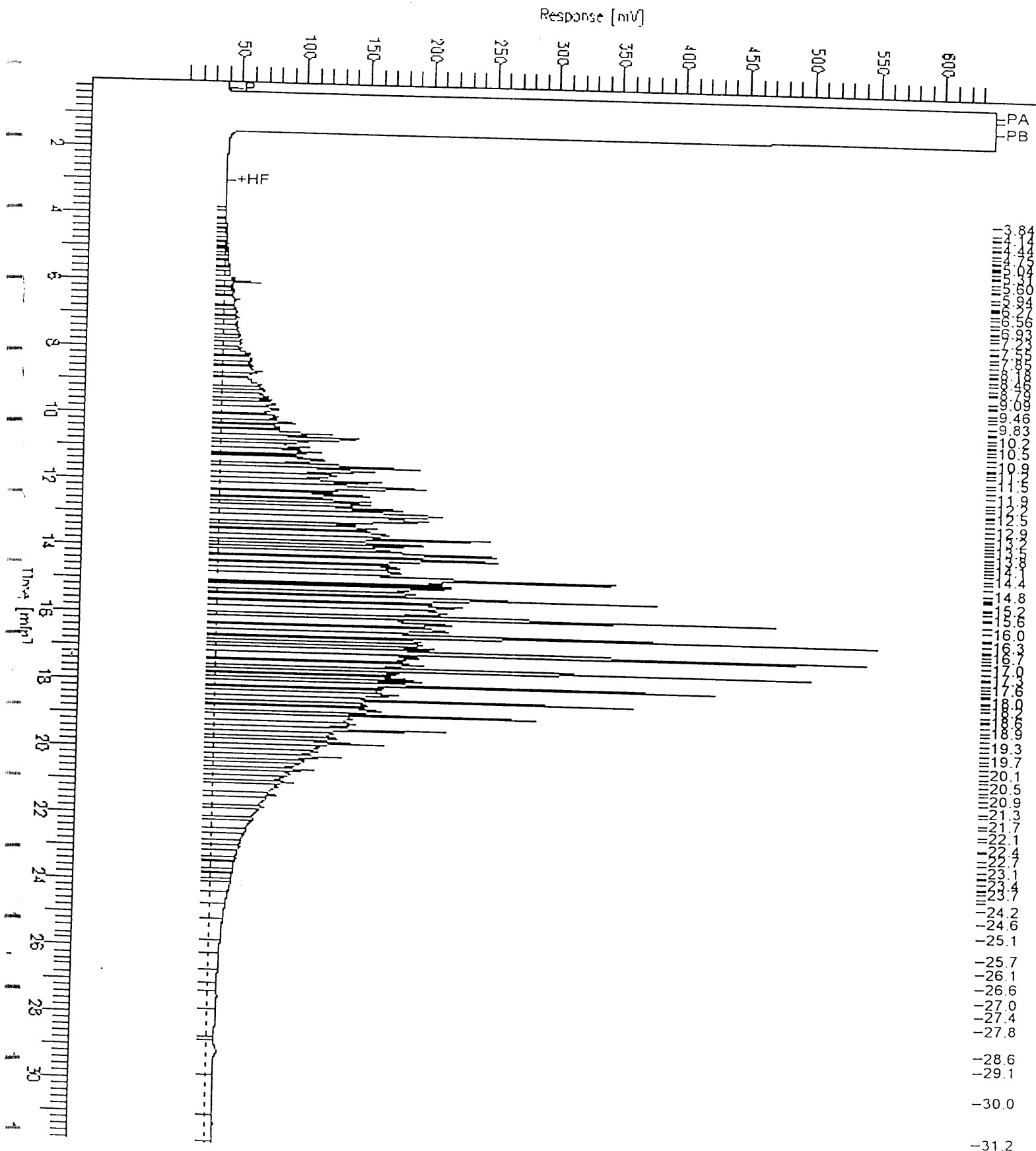
Time of Injection: 10/29/97 01:09 PM

Low Point : 5.65 mV

Plot Scale: 633.6 mV

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High Point : 639.22 mV



GC15 Channel B TEH

Sample Name : 131060-003,37102
 FileName : G:\GC15\CHBA\300B071.RAW
 Method : B286TEH.MTH
 Start Time : 0.00 min
 Scale Factor: 0.0

End Time : 31.90 min
 Plot Offset: -14 mV

Sample #: 37102

Date : 10/30/97 10:01 AM

Time of Injection: 10/29/97 01:52 PM

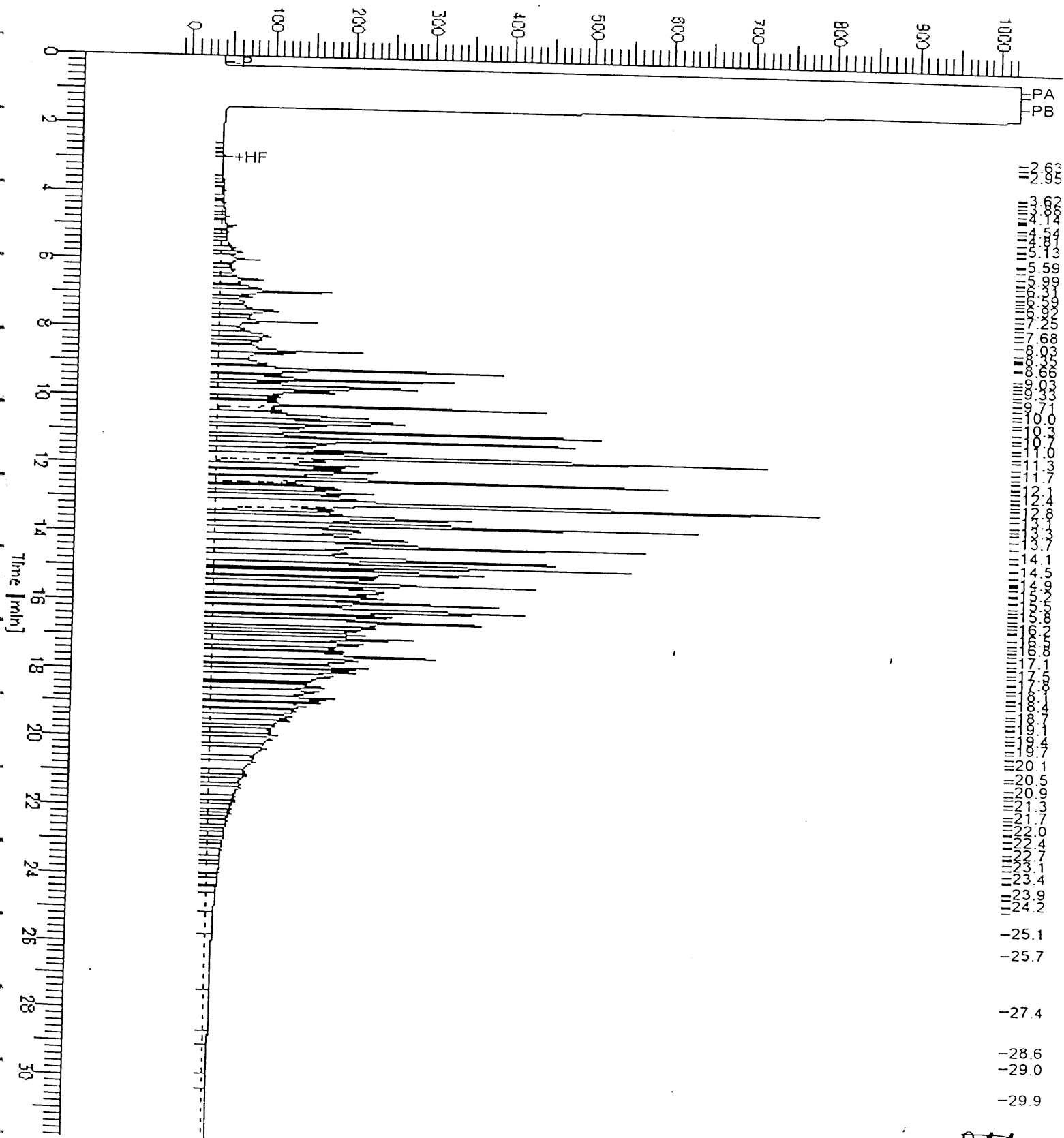
Low Point : -14.18 mV

Plot Scale: 1038.2 mV

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High Point : 1024.00 mV

Response [mV]



044
013

TECHNICAL MEMORANDUM

DATE: July 7, 1997

TO: Ms. Maryellen Mackenzie/ Department of the Army, Sacramento District,
Corps of Engineers

From: David V. Jenkins

Subject: **Respiration Test Results, Deep and Shallow Wells
TEAD Bioventing Site Building 637N**

INTRODUCTION

This technical memorandum presents the field activities and results of respiration testing conducted at Building 637N in the deep well from May 12 to May 23 and in the shallow well from June 10 to June 18. An analysis of data obtained is provided, including Kleinfelder's conclusions and recommendations for the site.

FIELD ACTIVITIES

Respiration testing for the 4" diameter deep vent well (screened from 120 to 170 feet below grade surface) was completed from May 12 to May 23. Following 24 hours of air injection at approximately 60 scfm, the well was sealed and oxygen concentrations were logged at 15-minute intervals for a total of ten days. Readings for the test were recorded using a small oxygen meter that was lowered into the well to the center of the screened interval.

Respiration testing for the 2" diameter shallow vent well (screened from 40 to 60 feet below grade surface) was completed from June 10 to June 18. Following 8 hours of air injection at approximately 60 scfm, the well was sealed and oxygen concentrations were logged at approximately 1-hour intervals for a total of seven days. Readings for this test were recorded with an infrared gas analyzer through a small tube that was lowered into the well to the center of

the screened interval from which gas samples were drawn and analyzed for oxygen and carbon dioxide.

TEST RESULTS

The results of the respiration testing are presented in Figures 1 and 2, attached. Spikes of high oxygen were indicated in the shallow respiration test, which were assumed a result of atmospheric changes, and were filtered out. This filtered the data set is presented graphically in Figure 3.

ANALYSIS OF RESULTS

The results from the deep respiration test at Building 673N are similar to the 637SE and 691 deep well results in that the oxygen demand is minimal. In the ten-day test the oxygen dropped by less than 4%, an average hourly rate of 0.015 %O₂/hr.

The shallow respiration test results rather erratic but do indicate distinct periods of high, sustained oxygen demand. These periods, circled in Figure 2, ranged from 0.2 to 1.1 %O₂/hr. The erratic upward spikes in oxygen concentrations in the well are most likely created by atmospheric changes at the surface (similar to the respiration results from Building 637SE). To develop a more consistent picture of the respiration behavior in the shallow zone at the site, the upward spikes in oxygen were filtered out and presented in Figure 3; oxygen cannot be produced in the surface so any upward trend is can be considered interference from the surface. The filtered results were averaged indicating an average degradation rate of 0.14 %O₂/hr over the test period.

According to the Air Force Center for Environmental Excellence (AFCEE) a field scale bioventing test should proceed at a site if oxygen utilization rates in a respiration test are between 0.05 to 1.0 %O₂/hr¹. Considering the data, the shallow zone satisfies the utilization criteria and the deep zone does not.

¹ From "Test Plan and Technical Protocol for a Field Treatability Test for Bioventing", Section 5.8.1.2; AFCEE; May 1992

CONCLUSIONS AND RECOMMENDATIONS

The shallow respiration test results at Building 637N meet the criteria to consider a field-scale pilot test of bioventing. The erratic, upward spikes in the oxygen data throughout the test may indicate that a considerable amount of passive respiration may be available to the shallow contamination. However, It is unclear to what extent or rate passive respiration could facilitate aerobic degradation of the contamination. If the passive degradation rate is slow, considerable time may be available for the contamination to migrate deeper. Further migration creates a problem considering the constituents spread contaminating more soil, contamination may eventually reach groundwater, and passive aerobic degradation is substantially less effective as contaminants migrate to deeper soil. Based on the available data and pending data from the bench test, Kleinfelder will likely consider a bioventing pilot test in the shallow zone as part of the Corrective Action Plan (CAP) for the site.

The respiration test results from the deep zone indicate that bioventing the deep soils is not an applicable approach. Furthermore, the sampling results in the deep zone indicate that further action may not be necessary. Kleinfelder recommends that the risks of the contamination in the deep zone be evaluated in the CAP and that "no further action" in the deep soils be considered.

Figure 1
Respiration Test Results for Bulding 637N-Deep
TEAD Bioventing Pilot Tests

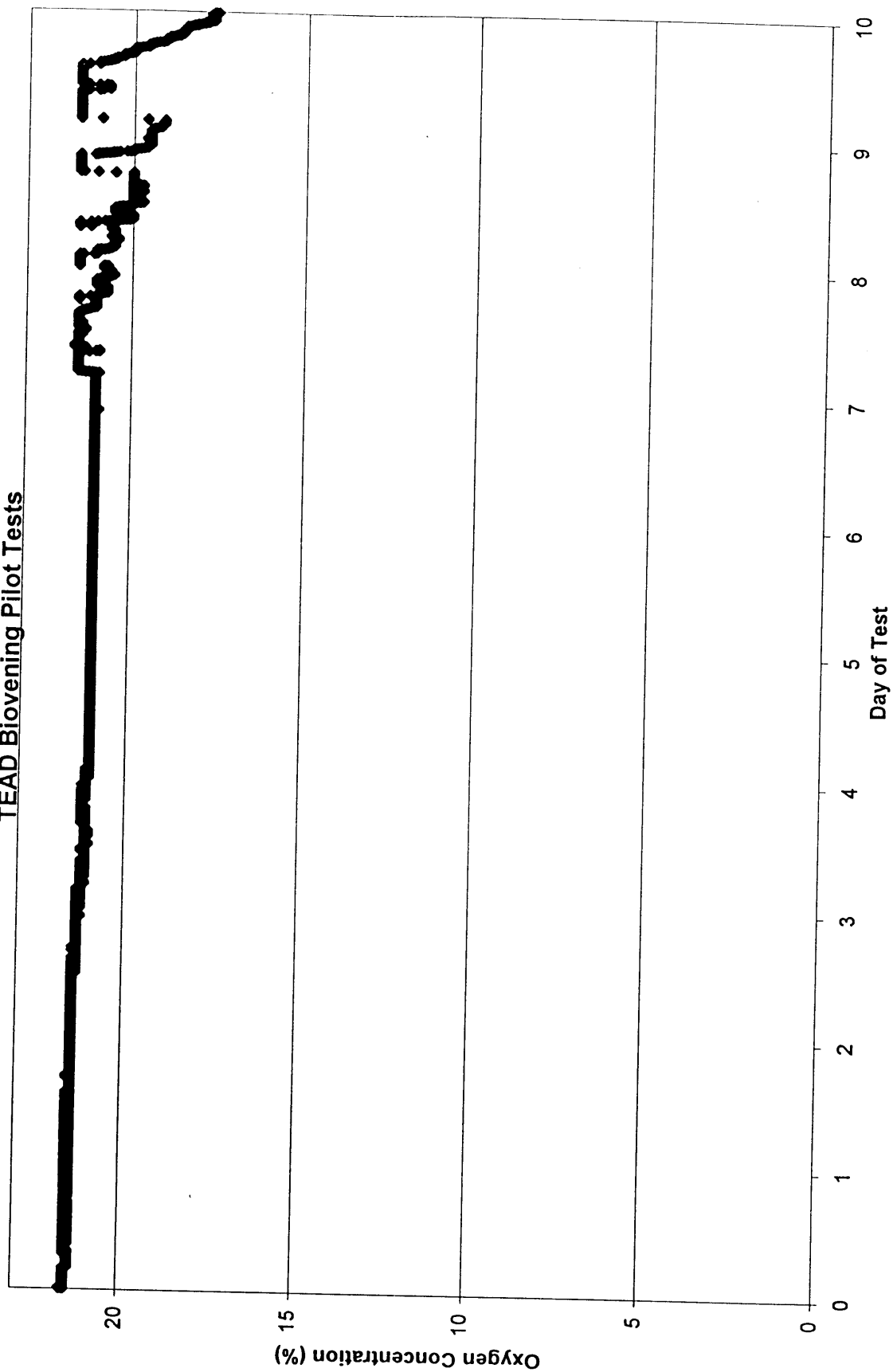


Figure 2
Respiration Test Results for Bulding 637N-Shallow
TEAD Bioventing Pilot Tests

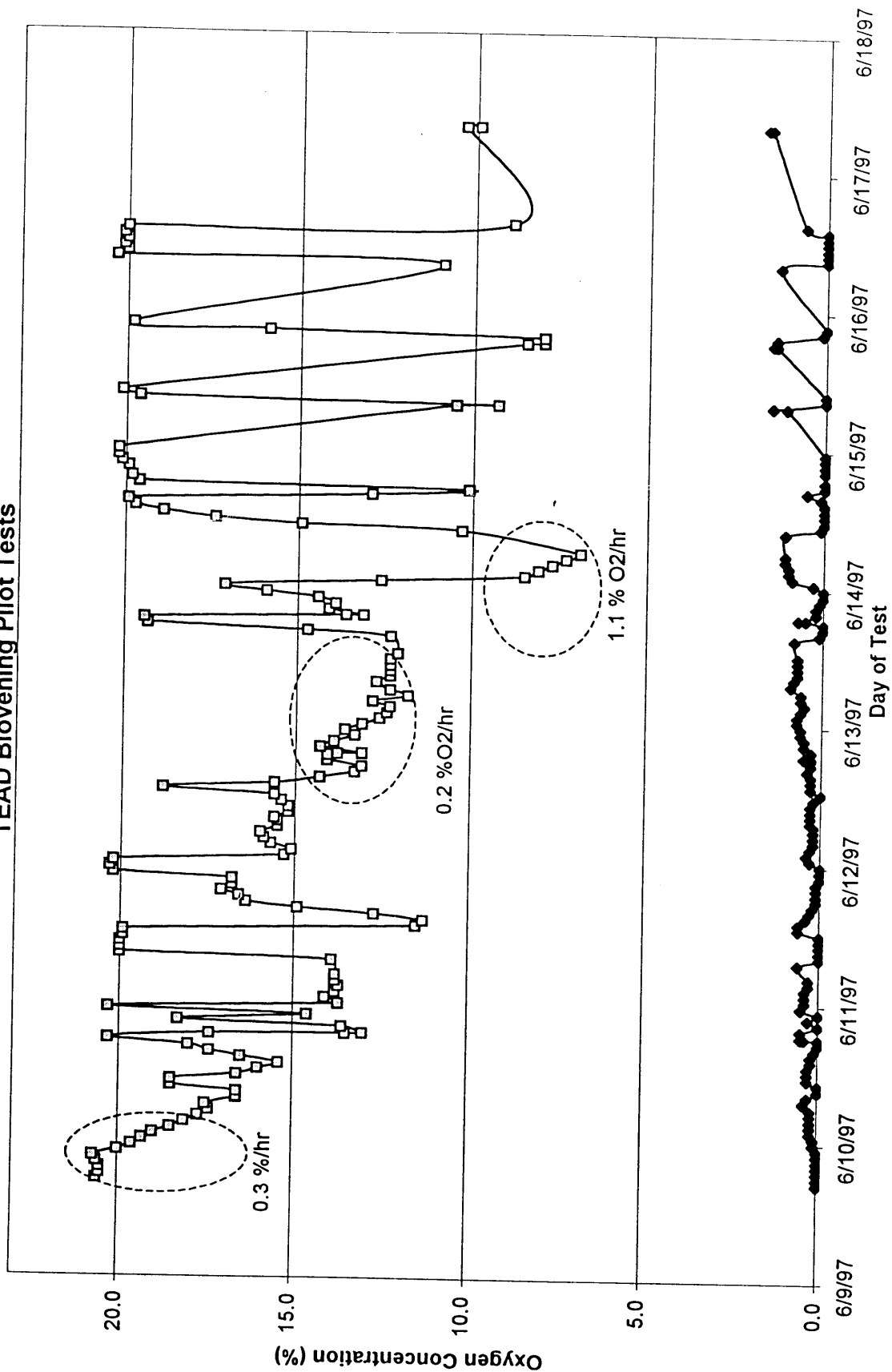
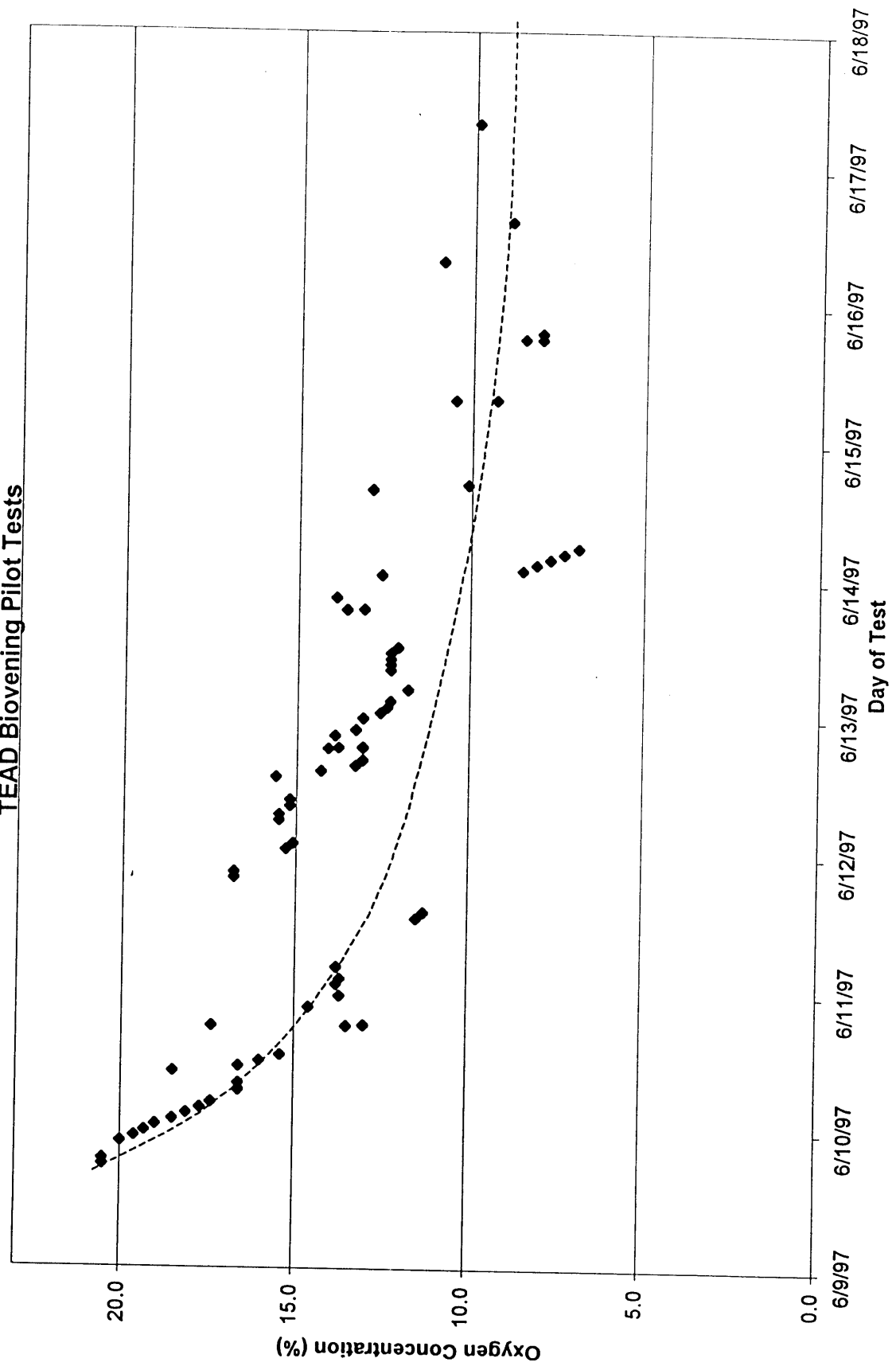


Figure 3
 Filtered Respiration Test Results for Bulding 637N-Shallow
 TEAD Bioventing Pilot Tests



COST SUMMARY TABLE
CORRECTIVE ACTION PLAN
BUILDING 637 NORTH, LUST SITE
TOOELE ARMY DEPOT, UTAH

	Option	1A				1B				2A				2B				4			
		Excavation Quantity (cy)				1350				450				450				3000			
	Cap Area (sf)																				
	Months of Operations	24				24				24				24				24			
DESIGN, PROCUREMENT		\$	11,525	\$	11,525	\$	11,525	\$	11,525	\$	11,525	\$	11,525	\$	11,525	\$	11,525	\$	11,525	\$	11,525
SOIL EXCAVATION		\$	39,717	\$	39,717	\$	39,717	\$	39,717	\$	35,442	\$	35,442	\$	35,442	\$	35,442	\$	35,442	\$	35,442
REMIEDIATE EXCAVATED SOIL		\$	74,340	\$	74,340	\$	74,340	\$	74,340	\$	36,540	\$	36,540	\$	36,540	\$	36,540	\$	36,540	\$	36,540
DISPOSAL																					
IMPORT																					
BACKFILL		\$	25,841	\$	25,841	\$	25,841	\$	25,841	\$	22,817	\$	22,817	\$	22,817	\$	22,817	\$	22,817	\$	22,817
CAP																					
LINER																					
INSTALLATION																					
TREATMENT SYSTEM INSTALLATION		\$	21,785	\$	21,785	\$	21,785	\$	21,785	\$	21,785	\$	21,785	\$	21,785	\$	21,785	\$	21,785	\$	21,785
O & M OF TREATMENT SYSTEM		\$	288,720	\$	288,720	\$	288,720	\$	288,720	\$	288,720	\$	288,720	\$	288,720	\$	288,720	\$	288,720	\$	288,720
BLOWER RENTAL		\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-
PROJECT MANAGEMENT, TECH SUPPORT		\$	26,670	\$	26,670	\$	26,670	\$	26,670	\$	26,670	\$	26,670	\$	26,670	\$	26,670	\$	26,670	\$	26,670
TOTAL COST		\$	488,599	\$	488,599	\$	509,618	\$	509,618	\$	443,500	\$	443,500	\$	450,506	\$	450,506	\$	352,300	\$	352,300

- 1A Excavate within Level II RCL, remediate soil on-site; Biovent Deep Soils
- 1B Excavate within Level II RCL, dispose of soil at Class II landfill; Biovent Deep Soils
- 2A Excavate within Tier I Screening Level, remediate soil on-site; Biovent Deep Soils
- 2B Excavate within Tier I Screening Level, dispose of soil at Class II landfill; Biovent Deep Soils
- 4 CAP to Level II RCL; Biovent Deep Soils